BARCO
COMMUNICATIONS n.v.
s.a.

CD 233 - GD 233

CF 33

OPERATING MANUAL

BARCO
INDUSTRIES
VIDEO &
COMMUNICATIONS

CD 233 - GD 233
CF 33

OPERATING MANUAL

CD 233 HRLP SB I
C9341210 220V

08570011

Introduction

To help you with the repairing and maintenance of your colour display, we made this technical manual.

The first part of this manual contains the technical information of the CD 233 and GD 233 colour data displays. In the second part is given technical information about the CF 33 colour data display frame that is build in the CD 233 and GD 233.

Modifications and upgradings will be announced by means of info T's.

Please note in all your correspondance concerning your display, the type and part number.

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Technical manual CF 33 (with table of contents)

Service Safety Precautions

WARNING : X-RADIATION

X-RADIATION CAN BE CAUSED IF CRITICAL COMPONENTS ARE REPLACED BY NON-CONFORM COMPONENTS. THESE COMPONENTS ARE MARKED IN THIS SERVICE MANUAL BY AN ✳

WARNING : SAFETY

ELECTRIC SHOCK OR FIRE HAZARD CAN BE CAUSED IF CRITICAL COMPONENTS ARE REPLACED BY NON-CONFORM COMPONENTS. THESE COMPONENTS ARE MARKED IN THIS MANUAL BY A ⚠ SIGN.

REPLACE WITH CONFORM TYPES ONLY !

1. Comply with all caution and safety-related notes on or inside the instrument cabinet, on the chassis, or on the picture tube.
2. When service is required, maintain correct lead dress and parts placement. Extra precaution should be taken to assure proper lead dress in the High Voltage circuit area.
   Where a malfunction has occured, those components or circuits that indicate evidence of abnormality should be replaced or corrected. Always use the manufacturer's safety specified replacement components.
3. Do not remove, install or handle the picture tube in any manner unless shatter-proof goggles are worn. People not so equipped should be kept away while picture tubes are handled. Keep picture tube away from the body while handling.
4. Protective shields are provided on this chassis for the protection of both the service technician and the customer.
   Protection shields removed for servicing convenience must be correctly re-installed and ANY MISSING SHIELD MUST BE REPLACED. DO NOT OPERATE THIS INSTRUMENT WITHOUT THE PROTECTIVE SHIELDS IN POSITION AND PROPERLY SECURED.
5. After any service intervention, the service technician must be sure that no protective device built into the instrument by the manufacturer has become defective, or inadvertently defeated during servicing. Therefore, the following checks are recommended for the continued protection of the customer and service technician.

GROUNDING CONTINUITY TEST

— remove mains plug from wall outlet.

— with an ohm-meter in its lowest resistance range, measure resistance between the grounding prong of the mains plug and all accessible conductive parts.
THE METER MUST READ ZERO OHM

— the mains plug still being removed from the wall outlet, switch on the instrument.

— with an ohm-meter in its highest resistance range, measure resistance between the grouding prong of the mains plug and the two other prongs of the mains plug.
BOTH METER READINGS MUST BE MORE THAN 5 MEGOHM.

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE THE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND CORRECTIVE ACTION MUST BE TAKEN BEFORE RETURNING THE INSTRUMENT TO THE CUSTOMER.

X-RADIATION AND HIGH VOLTAGE LIMITS

The primary source of X-radiation in solid state display units is the picture tube. The picture tube is specially constructed to limit X-radiation emissions. The shields and mounting hardware for picture tubes have an X-radiation protection function and must be properly in place.
For continued X-radiation protection, the replacement tube must be the same type as the original, including suffix letter. High voltage is maintained within specified limits by the use of close tolerance safety related components / adjustments in the power supply circuit. Refer to the Technician X-radiation warning note on the Chassis Schematic and Instrument Labels in the Basic Service Data for specific high voltage limits of each chassis and X-radiation Protection Circuits. If high voltage exceeds specified limits, check each component specified on the chassis schematic diagram and take necessary corrective action.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in display units have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by then necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Data and its Supplements and Bulletins. Electrical components having such features are identified by ⚠ or ✳ on the schematics and on the parts list in this Data and its Supplements and Bulletins. The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the parts list in this Data and its Supplements and Bulletins, may create shock, fire, or ejessive X-radiation.

NOTE FOR USERS IN THE UNITED KINGDOM :

IMPORTANT :

The wires of the mains lead are coloured in accordance with the following code :

Green and Yellow : EARTH
Blue : NEUTRAL
Brown : LIVE
Plug fusing value : 5 A

As the colours of the wires in the mains lead of this apparatus may not correspond with the colotred markings identifying the terminals in your plug, proceed as follows :

— The wire which is coloured Green and Yellow must be connected to the terminal in the plug which is marked by the letter E or by the safety earth symbol ⏚ or coloured green and yellow.

— The wire which is coloured Blue must be connected to the terminal which is marked with the letter N or coloured black.

— The wire which is coloured Brown must be connected to the terminal which is marked with the letter L or coloured red

WARNING : This apparatus must be earthed.

WARNING:This equipment generates,uses,and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual,may cause interference to radio communications.It has been tested and found to comply with the limits for a class A computing divice, persuant to Subpart J of Part 15 of FCC Rules,which are designed to provide reasonable protection against such interference when operated in a commercial environment.Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

CAUTION: HIGH VACUUM PICTURE TUBE

IS DANGEROUS TO HANDLE REFER REPLACEMENT TO QUALIFIED SERVICE PERSONNEL

EMPLOYS X RADIATION AND INTEGRAL IMPLOSION PROTECTION REPLACE WITH A TUBE OF THE SAME TYPE NO. AND SUFFIX FOR CONTINUED SAFETY

X RADIATION WARNING

REPLACEMENT OF CRITICAL COMPONENTS OF THIS APPARATUS (PICTURE TUBE AND OTHERS) CAN RESULT IN EXCESSIVE X RADIATION, THESE COMPONENTS ARE MARKED IN THE SERVICE MANUAL BY AN*

- REPLACE ONLY WITH CONFORM TYPES
- SEE SERVICE MANUAL FOR HIGH VOLTAGE ADJUSTMENT INSTRUCTIONS

CAUTION: TO DETERMINE THE PRESENCE OF HIGH VOLTAGE, KINE HIGH VOLTAGE MUST BE DISCHARGED TO CHASSIS

ACHTUNG

Diese in diesem Gerät entstehende Röntgenstrahlung ist ausreichend abgeschirmt.
Beschleunigungsspannung maximal 23 kV.
Ersatz bestimmter Bauteile kann erhöhte Röntgenstrahlung verursachen.
Diese Bauteile sind deshalb in der Bedienungsanleitung mit einen * gekennzeichnet. Nur durch baugleiche Bauteile zu ersetzen!
Zulass. Nummer: BW/153/83 /Rö

Beam current : 150 μA
EHT : 22,8 kV
Date : 7/12/85

Technical Specifications

CD 233 - GD 233

Common features.

Power Supply: 120V + 15 % - 20 % or 220V + 15 % - 20 %

Safety: Complies with the DHHS rules at date of manufacturing.

Environmental Conditions. Ambient temperature 0-45°C.
Humidity: 10 - 90 % RH
Altitude: 10.000 feet.

High reliability: MTBF over 10.000 hrs.

Color temperature: Adjusted on 9.300°K

Options.

- Optical filter anti-reflective.
- 19 inch rack mountable.
- High resolution - long persistence - short blue

GENERAL TECHNICAL SPECIFICATIONS

Scanning systems :

525 lines 60 Hz interlaced
625 lines 50 Hz interlaced

Power

- Mains voltage: 120 Vac or 220 vac +15%-20%
- Power consumption : Less than 100 W.
- Mains frequency : 48 to 66 Hz.
- Mains isolated switch mode power supply.

Power connection :

- Eurodin plug.
- 2.5 m detachable three-wire grounding type power cable.

Inputs :

1. Analog RGBS

External or internal sync. mode (selectable by switch).

- Red :

non composite 0.7 Vpp +/– 6 dB positive.

- Green :

non composite (external sync.) 0.7 Vpp +/– 6 dB positive.
composite (sync. on green) 1.0 Vpp +/– 6 dB (0.7 V video + 0.3 V sync.).

- Blue :

non composite 0.7 Vpp +/– 6 dB positive.

- Sync :

(external sync) negative 4 Vpp +/– 6 dB.

- Connectors : BNC.

- All inputs are looped through output with high impedance or terminated with 75 Ohms internally by means of a switch.
- EXTERNAL or INTERNAL sync mode selectable (switch).

2. TTL compatible

RGB performance :

- frequency response :
15 kHz to 15 MHz + 1 / − 3 dB gradual roll of.

Synchronisation :

- Horizontal scanning :
Horizontal retrace time less than 10 uS.
Vertical scanning :
Vertical retrace time less than 1 mS.
- RS 170 compatible.

Display performance :

- Picture tube : 14" (33 cm) - in line gun - 90°.
- Overscan possible by adjusting vertical and horizontal amplitude controls.
- Deflection linearity : less than 2% picture height.
- High resolution, dotted screen, in line gun, shadow mask, auto convergent black matrix CRT.
Pitch = 0.31 mm.
Resolution : 720 x 490 pixels.
Misconvergence : Center : 0.4 mm. Corners : 1.0 mm.
- Midium resolution
- Aspect ratio :
adjusted for 4/3 aspect ratio (for CD 233)
Underscan :
standard 4 corners in display (for CD 233)

Warm up period :

30 minutes to meet specs.

Degaussing :

Automatic degaussing on switch-on.

X-ray radiation :

≤ 0.1 mR /hour at 2" (5 cm) from any external surface of the monitor. Complies with the DHHS rules and regulations as of the date of manufacturing.

Dimensions :

H 11" x W 16" x D 14 1/8".
H 281 x W 405 x D 360 mm.

Weight :

15,5 kg.
,5 lb.

Picture tube specs

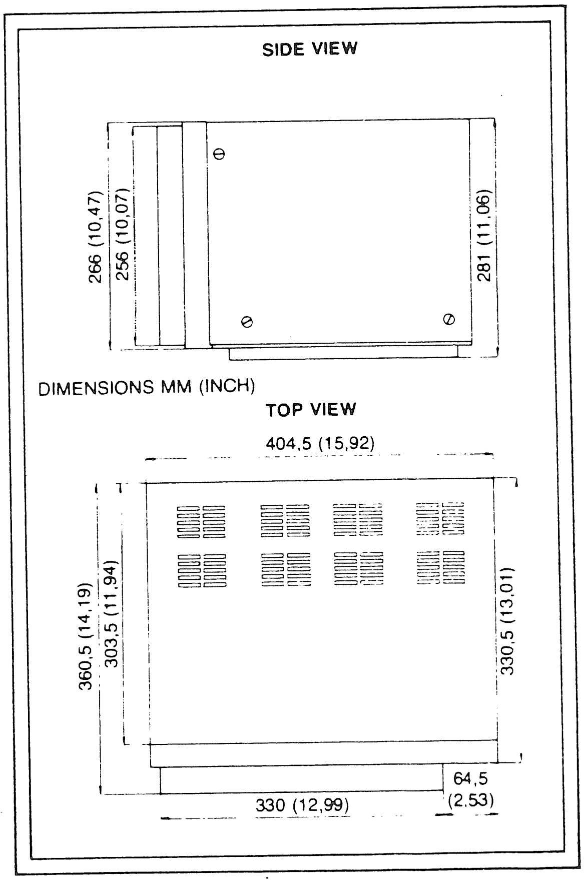
	Red	Green	Blue
Standard persistence P 22	1msec.	150usec.	100usec.
Long persistence short blue	120msec.	150msec.	100usec.
Relative brightness Standard persistence	100	100	100
Relative brightness Long persistence	42	55	100

Medium resolution picture tube :

size	14 inch (13V)-33 cm
screen	black matrix
type	90° in line
pitch	44 mm
phosphor	P22: normal persistence
Convergence	zone A: max 0,4 mm zone B: max 0,7 mm zone C: max 1 mm
Resolution	hor. 580 dots or pixels vert. 430 lines or pixels

High resolution picture tube :

size	14 inch (13V)-33 cm
screen	black matrix
type	90° in line
pitch	.31 mm
phosphor	P22: normal presistence long persistence short blue on request
Convergence	zone A: max 0,4 mm zone B: max 0,8 mm zone C: max 1 mm
Resolution	hor. 720 dots or pixels vert. 540 lines or pixels



Technical Specifications

CD 233 HR-TTL-I

The CD233 HR-TTL-I is a high resolution colour monitor designed by Barco Industries Video & Communications to be used with the I B M personal computer. The monitor is equipped with a halftone TTL RGBS input board allowing a 16 colour display offered by the I B M graphics board.
The monitor is connected to the IBM personal computer by means of a customized cable supplied with the monitor.
Applying our years experience in designing and manufacturing high quality monitors we offer you a product with an extreme high reliability meeting all the requirements of the IBM personal computer.

Picture tube :	Size : 33 cm (14 inch) Screen : black matrix Type : 90° in-line Pitch : . 31 mm Phosphor : P22 - normal persistence
Convergence :	Zone A: max. 0,4 mm Zone B: max. 0,8 mm Zone C: max. 1 mm
Resolution :	Hor.: 720 dots or pixels Vert.: 540 lines or pixels
RGB Bandwidth :	50 Hz – 15 MHz + 1 – 3 dB
Scanning frequency :	525 lines - 60 Hz RS 170 compatible
Display size :	270 × 200 mm
Power consumption :	60 W max.
Power supply :	220 V + 15 % – 20 % 48 – 66 Hz
Signal Input :	TTL: RGBS cannon D Halftone: 16 colours
Geometry :	Deviation less than 2 % of picture height on any point of picture tube
Aspect ratio :	4 : 3
Weight net :	16,5 kg
Dimensions :	H 266 mm - D 405 mm - W 396 mm
Options :	Optical filter anti-reflective

Technical Specifications

CD 233 - GD 233

Common features.

Power Supply: 120V + 15 % - 20 % or 220V + 15 % - 20 %

Safety: Complies with the DHHS rules at date of manufacturing.

Environmental Conditions. Ambient temperature 0-45°C.
Humidity: 10 - 90 % RH
Altitude: 10.000 feet.

High reliability: MTBF over 10.000 hrs.

Color temperature: Adjusted on 9.300°K

Options.

- Optical filter anti-reflective.
- 19 inch rack mountable.
- High resolution - long persistence - short blue

GENERAL TECHNICAL SPECIFICATIONS

Scanning systems :

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Power

- Mains voltage: 120 Vac or 220 vac +15%-20%
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- Blue

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- Sync

(external sync) negative 4 Vpp +/– 6 dB.

- Connectors : BNC.

- All inputs are looped through output with high impedance or terminated with 75 Ohms internally by means of a switch.
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2. **TTL compatible**

RGB performance :

- frequency response :
15 kHz to 15 MHz + 1 / − 3 dB gradual roll of.

Synchronisation :

Horizontal scanning :
Horizontal retrace time less than 10 uS.

- Vertical scanning :
Vertical retrace time less than 1 mS.

- RS 170 compatible.

Display performance :

- Picture tube : 14" (33 cm) - in line gun - 90°.

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Aspect ratio :
Adjusted for 4/3 aspect ratio (for CD 233)

- Underscan :
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Warm up period :

30 minutes to meet specs.

Degaussing :

Automatic degaussing on switch-on.

X-ray radiation :
≤ 0.1 mR /hour at 2" (5 cm) from any external surface of the monitor. Complies with the DHHS rules and regulations as of the date of manufacturing.

Dimensions :

H 11" x W 16" x D 14 1/8".
H 281 x W 405 x D 360 mm.

Weight :

[illegible]3,5 kg.
29,5 lb.

Picture tube specs

	Red	Green	Blue
Standard persistence P 22	1msec.	150usec.	100usec.
Long persistence short blue	120msec.	150msec.	100usec.
Relative brightness Standard persistence	100	100	100
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High resolution picture tube :

size	14 inch (13V)-33 cm
screen	black matrix
type	90° in line
pitch	.31 mm
phosphor	P22: normal presistence long persistence short blue on request
Convergence	zone A: max 0,4 mm zone B: max 0,8 mm zone C: max 1 mm
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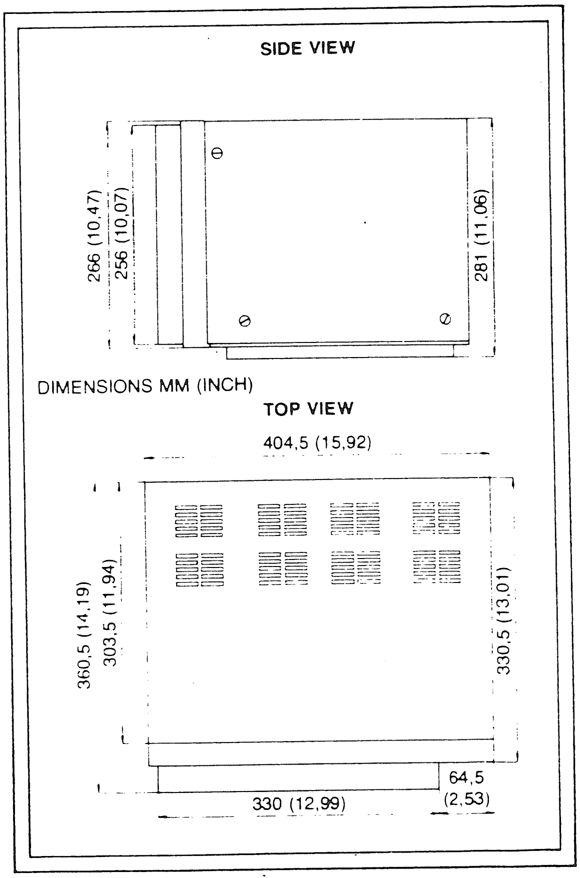

Technical Specifications

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The monitor is connected to the IBM personal computer by means of a customized cable supplied with the monitor.
Applying our years experience in designing and manufacturing high quality monitors we offer you a product with an extreme high reliability meeting all the requirements of the IBM personal computer.

Picture tube :	Size : 33 cm (14 inch) Screen : black matrix Type : 90° in-line Pitch : . 31 mm Phosphor : P22 - normal persistence
Convergence :	Zone A: max. 0,4 mm Zone B: max. 0,8 mm Zone C: max. 1 mm
Resolution :	Hor.: 720 dots or pixels Vert.: 540 lines or pixels
RGB Bandwidth :	50 Hz – 15 MHz + 1 – 3 dB
Scanning frequency :	525 lines - 60 Hz RS 170 compatible
Display size :	270 × 200 mm
Power consumption :	60 W max.
Power supply :	220 V + 15 % – 20 % 48 – 66 Hz
Signal Input :	TTL: RGBS cannon D Halftone: 16 colours
Geometry :	Deviation less than 2 % of picture height on any point of picture tube
Aspect ratio :	4 : 3
Weight net :	16,5 kg
Dimensions :	H 266 mm - D 405 mm - W 396 mm
Options :	Optical filter anti-reflective

Operating instructions

CD 233 - GD 233

General Introduction

The CD 233 is a high quality, high resolution colour display especially designed to provide the visual reproduction required for graphic terminals. Together with the appropriate intelligent keyboard the succesful development and interpretation of graphics can be achieved.

Despite the highly sophisticated technologie giving optimum colour reproduction the monitor is compact and lightweight making it most suited for desk-top use. In this particular environment the high resolution picture tube is of great advantage as it provides a crisp, sharp picture which enhances legibility and so combats operator fatigue.

The quality colour reproduction allows an interesting dimension to be added to all displays bringing them to life and increasing their power of communication.

Please read and follow these instructions carefully to be assured of getting the best performance from your monitor whose fine qualities we are sure you will come to appreciate as you work with it.

WARNING

Do not open the cabinet. Dangerously high voltages are present inside the set. No user serviceable parts inside. Refer servicing to qualified service personnel.

POSITIONING THE DISPLAY

The display should be positioned to allow some distance between your normal viewing position and the screen as viewing from too close-by is not recommended. The screen should always be positioned so that it is perpendicular to your line of vision. This can be done with the help of the stand-off device under the display. Eye strain can also be caused by viewing in a completely darkened environment. Another factor to be taken into account when positioning the display is ambient lighting conditions. Sources of light (lamps or windows) in front of the display have a tendency to reflect in the screen and cause an apparent loss of contrast. The best lighting conditions are obtained by having a subdued source behind the display.

The CD 233 requires a free flow of air around it for cooling purposes. For this reason covers should never be placed on or around the monitor and the ventilation grilles should never be blocked. The CD 233 should never be exposed to direct heat sources or excessive dust. To prevent fire or shock hazard do not expose this appliance to rain or moisture.

Demagnetisation

Because of its design the high resolution picture tube is more sensitive to magnetic fields than a normal picture tube. Therefore, the display should never be placed in the vicinity of magnets or sources of magnetic disturbances, such as loudspeakers, transformers, heavy power lines or electric motors. The CD 233 contains a demagnetisation circuit which counteracts the effect of the earths magnetism each time the display is switched on. If the display is moved then some colour impurities may occur so switch the set off and then on again. Because of the effect of this circuit it is advisable to keep all items carrying magnetic information away from the monitor, for example, music cassettes, magnetic tapes, floppy discs, magnetically coded credit cards.

Power connection

Depending on your order, the display is designed to operate with a power supply voltage of 120 Volt or 220 Volt AC. Before connecting your display to the power outlet ensure that the voltage supply correspond with the voltage noted on the label at the rear of your display.

If this is not the case or if in doubt consult your nearest service centre.

The power supply cord which is delivered with the display should first be connected to the display inserting it in the three blade socket at the rear before plugging it into the nearest power outlet.

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows :

- The wire which is coloured Green and Yellow must be connected to the terminal in the plug which is marked by the letter E or by the safety earth symbol ⏚ or coloured green and yellow.
- The wire which is coloured Blue must be connected to the terminal which is marked with the letter N or coloured black.
- The wire which is coloured Brown must be connected to the terminal which is marked with the letter L or coloured red.

WARNING : This appartus must be earthed.

IMPORTANT : The wires of the mains lead are coloured in accordance with the following code.
Green and yellow : Earth
Blue : Neutral
Brown : Live
Fusing value : 5 A.

Front panel controls

ON/OFF switch (power supply indicator)

Depressing this switch places the display under power. The power on indicator in the switch itself will light. Pressing the switch again to release it will switch off the display.

Brightness control

This control can be used to adjust the brightness of the display.

Contrast control

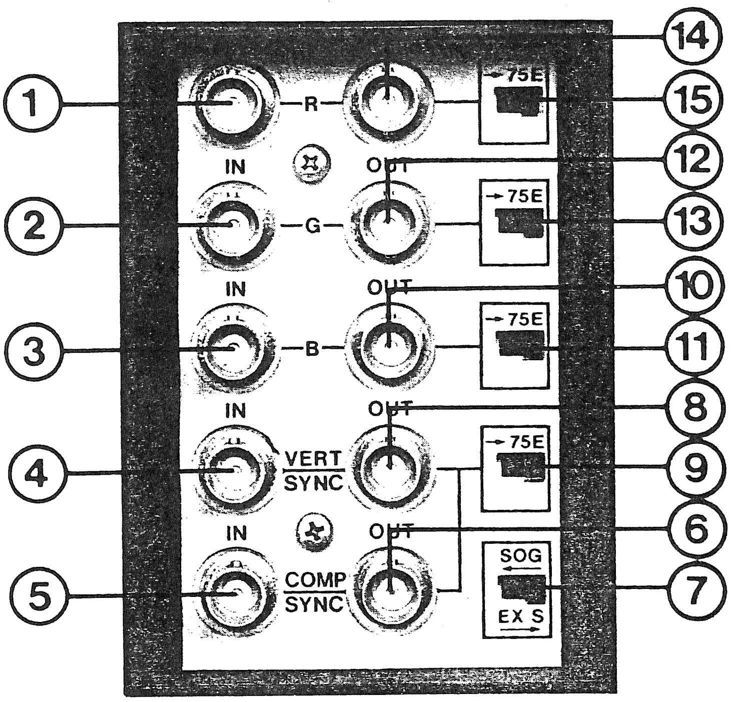
Adjust the contrast with this control to suit your preference and lighting conditions.

Connections

The panel for the connection of the signal source is located at the rear of the display. This panel consists of four pairs of BNC type connection sockets, four termination switches and one selection switch for synchronisation. Each pair of connectors consists of one input socket and one looped through output socket. Corresponding to each pair of connectors is a termination switch which must be placed in the 75 Ohm position when the output socket is not used. When the output socket is used place the corresponding switch in the high impedance position. For a TTL version, this panel consist of one 9 pins, D type connector.

1. For Analogue versions

1. Input red
2. Input green
3. Input blue
4. Vertical synchronisation input
5. Horizontal or composite sync. input
6. Horizontal or composite sync. output
7. Synchronisation selection switch
8. Vertical synchronisation output
9. Synchronisation termination switch
10. Output blue
11. Blue termination switch
12. Output green
13. Green termination switch
14. Output red
15. Red termination switch



Connecting one display only

Connect a cable with BNC connectors from each of the sockets of the keyboard marked R, G and B to the corresponding sockets on the monitor. Ensure that each connector is pushed in and turned to lock it in position. Place the termination switches in the 75 Ohm position.

Connecting more than one display

As before connect a cable with BNC connectors from each of the sockets of the keyboard marked R, G and B to the corresponding sockets on the monitor. Using similar cables connect the output sockets with the corresponding input sockets of the following monitor. If there are more monitors continue this procedure. All termination switches except for those of the last display must be placed in high impedance position. Place those of the last display to be connected in the 75 Ohm position. In this way upto 10 monitors can be connected to one source.

Synchronisation

Two methods of synchronising the display are possible and your choice will depend on the signal provided by your signal source. If the synchronisation signal is combined with the green ignal then the only requirement is that the synchronisation selection switch be placed in the position „G''. If, however, an external synchronisation signal is provided an additional cable must be used to connect this signal to the BNC type connection socket marked „S''. The selection switch must then be placed in the „x'' position. The termination switch of the synchronisation socket is used in a similar manner to the other termination switches. If external synchronisation is used for one monitor place the termination switch in the 75 Ohm position. If more than one display is used place all the swtiches in the high impedance position except for the switch of the last display.

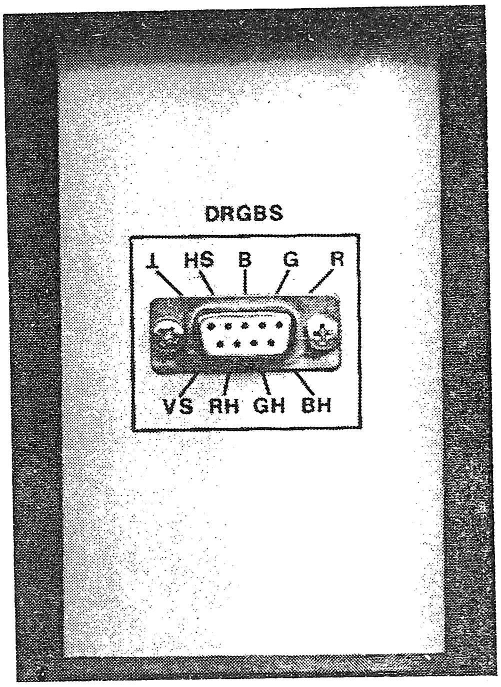
2. TTL compatible versions

The selection of the colours is done by the combination of digital signals on the colour inputline or halfcolour inputline (intensity line).

The logic of the digital signals can be selected internally. Consult your dealer for more information.

When leaving factory followed selection has been set :
positive going TTL level for red, green and blue.
negative going for synchronisation signal.
Composite synchronisation.

Connections
1. Red input
2. Green input
3. Blue input
4. Composite or horizontal sync input
5. Ground
6. Half blue
7. Half green
8. Half red
9. Vertical sync input



The colour selection for a standard set : level 1 is + 5 V and level 0 is ground.
The intensity line only can only be activated when the colour input line has been selected.

Colour input line	Intensity line	Result
0	0	0% colour
1	0	100% colour
1	1	50% colour

This combination can be done on each of the three colour input lines, what results in 27 different colours.

Anti-glare and contrast enhancing filter (optional)
Assembly instructions C9824410

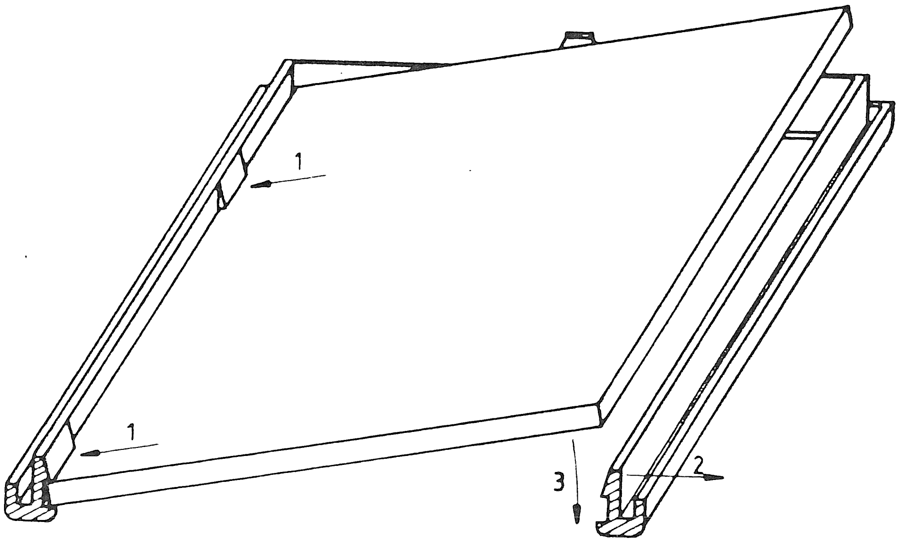
Contents : 1 glass filter plate.
1 plastic frame.
1 can optical cleanser.

The filter is made of special laminated glass with distinct front and rear faces. The front has been treated with a blue anti-reflective coating which cuts annoying reflection to virtually nil. The rear face, however, reflects like normal dark glass.

Remove the filter from its packing, you will notice that the glass has been packed in an extra layer of film in order to prevent the surface from becoming scratched. The front face has been marked with a label bearing the word "FRONT". The filter must be assembled with the rear face towards the surface of the display. Carefully strip the film from the filter while holding the glass by the edges so avoiding making finger marks on its surface.

Fitting the filter in the frame.

- Lay the plastic filter frame face down, i.e. with the clips facing upwards, on a flat soft surface (see fig. 1 below).



- Position the glass so that one edge is in position (1). Make sure that the front of the filter faces downwards.

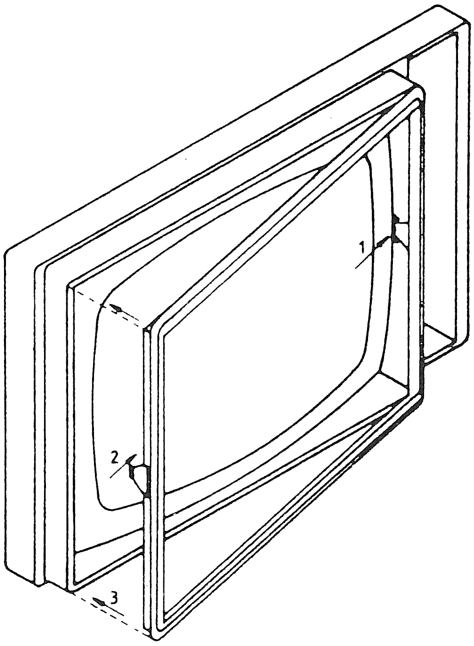
- Gently pull the side of the frame away from the glass (2) and carefully push the filter into the frame (3).

If, despite your care, there are finger marks on the glass, clean the filter in the way described under the heading "Cleaning the Filter" on page 3.

Fitting the filter onto the front bezzel of the terminal.

- Clean the screen of the terminal and the front bezzel around it.

- Check that the inside edge of the frame is provided with notches for the clips of the filter carrier (1). If not you should order the front bezzel nr. C721553.



- Position one of the clips into a notch on the side of the front bezzel (1).

- Push the other clip so that it passes on the inside of the front bezzel.

- Push the filter plastic frame into the front bezzel.

Cleaning the filter

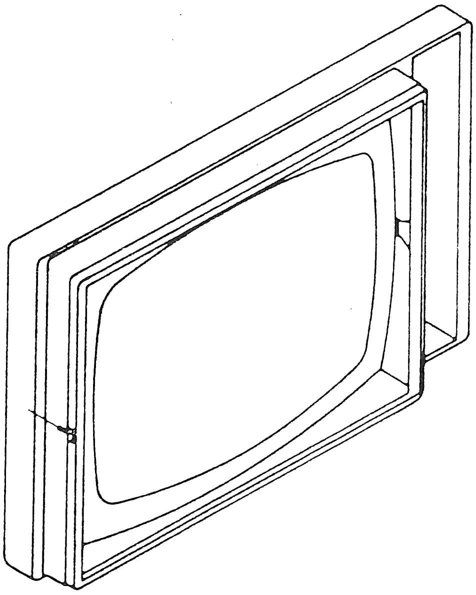
For cleaning the filter we advise to use only the optical cleanser delivered with the filter.

- Use a lint free cloth or a soft tissue paper.
- Shake a few drops of optical cleanser onto it.
- Polish the glass making movements in one direction only.

We recommend that the filter glass is cleaned back and front at least once every six months.

How to remove the filter.

When the filter frame is installed it will be noticed that there are notches between the filter frame and the display front bezzel.



- Insert your finger in one of the notches.
- Pull gently at the side of the filter frame.
- The filter frame will come free, allowing you to remove it.

CD 233 - GD 233 CROSS REFERENCE LIST (FOR COMMON PARTS OF ALL VERSIONS, SEE PARTS LIST)

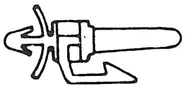
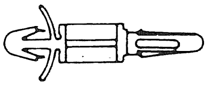
ITEM	NAME/RESOLUTION/ INPUT/MAINS	PICTURE TUBE * NUMBER	DESCRIPTION	MAINBOARD * *	UN.CSB	INPUT UN. * * *	CRT SOCKET *
C9341050	CD 233 HR A 220V	C1310901	370JYB22TC04	C660033	C660115	RGB ANALOG	C660121
C9341060	CD 233 HR A 120V	C1310901	370JYB22TC04	C660032	C660115	RGB ANALOG	C660121
C9341070	CD 233 HR TTL 220V	C1310901	370JYB22TC04	C660033 (C660027)	C660128	C660127	C660121
C9341080	CD 233 HR TTL 120V	C1310901	370JYB22TC04	C660032 (C660026)	C660128	C660127	C660121
C9341090	CD 233 MR A 220V	C131102	370LJB22TC04	C6600331	C660115	RGB ANALOG	C660121
C9341100	CD 233 MR A 120V	C131102	370LJB22TC04	C6600321	C660115	RGB ANALOG	C660121
C9341110	CD 233 MR TTL 220V	C131102	370LJB22TC04	C6600331(C6600271)	C660128	C660127	C660121
C9341120	CD 233 MR TTL 120V	C131102	370LJB22TC04	C6600321(C6600261)	C660128	C660127	C660121
C9311130	CD 233 HRLP A 220V	C131105	370JYB22TC04LP	C660033	C660115	RGB ANALOG	C660121
C9341140	CD 233 HRLP A 120V	C131105	370JYB22TC04LP	C660032	C660115	RGB ANALOG	C660121
C9341150	CD 233 HRLP TTL 120V	C131105	370JYB22TC04LP	C660033 (C660027)	C660128	C660127	C660121
C9341160	CD 233 HRLP TTL 120V	C131105	370JYB22TC04LP	C660032 (C660026)	C660128	C660127	C660121
C9341170	GD 233 HR A 50HZ220V	C131090	370HYB22TC09	C660033	C660115	RGB ANALOG	C660120
C9341180	GD 233 HR A 60HZ120V	C131090	370HYB22TC09	C660032	C660115	RGB ANALOG	C660120
C9341190	CD 233 HR TTL I 220V	C1310901	370JYB22TC04	C660033 (C660027)	C660128	C660134	C660121
C9241200	CD233 HR TTL I 120V	C1310901	370JYB22TC04	C660032 (C660026)	C660128	C660134	C660121

* the CD 233 and GD 233 can be equipped with another picture tube than the one listed above; please check the number of the picture tube and the CRT socket unit of your display before ordering spare parts

* * for earlier models, number between brackets

* * * the ANALOG RGB INPUT is composed of the boards C660072 + C660074 + C6601261

PARTS LIST CD 233 - GD233

REF.NR.	DESCRIPTION	NOTES
C13.....	PICTURE TUBE	SEE CROSS REFERENCE LIST
C312000	SPRING AQUADAG 7 X 50/0.60	
C313335	SPACER 12.7 	FOR MOUNTING MAINBOARD ON METAL BASE PLATE C600130
C313338	SPACER 12.7 	FOR MOUNTING MAINBOARD ON METAL BASE PLATE C600130 AND INPUT UNIT ON METAL INPUT FIXATION PART
C313614	CONNECTORHOUSE DEFLECTION	
C326103	CORD MAINS 3 X 0.75	NORMALLY IF 220Vac
C326111	CORD MAINS UL/CSA	NORMALLY IF 120Vac
C348024	CABLE FASTENER	PLASTIC CABLE FIXATION PART (2 PIECES TO FASTEN WIRING OF CONTROL PANEL TO METAL BASE PLATE C600130)
C348901	FLAT CABLE SHIELDED CF33	INTERCONNECTION BETWEEN INPUT AND RGB OUT AMPLIFIER C660020
C348902	FLAT CABLE POWER CF33	INTERCONNECTION BETWEEN MAINBOARD AND RGB OUT AMPLIFIER
C349040	CORD IBM-PC	FOR IBM-PC DISPLAYS ONLY (PC TO CD)
C3490355	CORD. COMPL. CD233	FOR RGB ANALOG INPUT ONLY
C3490395	CORD. COMPL. C660127	FOR TTL INPUT ONLY (WITH 9 PIN D-CONNECTOR)
C600068	ISOLATION	ISOLATION IN METAL TOP COVER AT POSITION OF EHT CONNECTOR
C600089	BACKCOVER GD 233	BACKCOVER WITHOUT PLASTIC PARTS
C600090	BACKCOVER CD 233	BACKCOVER WITHOUT PLASTIC PARTS
C6000951	DPL CSB CD 233	DECORATIF FRONT COVER PLATE FOR CD 233
C600130	BASE PLATE CD 233	METAL BASE PLATE ON WHICH IS MOUNTED THE MAINBOARD
C600150	SUPP. LIN. INP. CD 233	METAL FIXATION PART FOR INPUT UN.
C600162	FIX. INPUT CD 233	METAL FIXATION FOR INPUT UNIT TO CHASSIS
C600164	FIX. RGB CD 233	METAL FIXATION FOR INPUT UNIT TO CHASSIS
C600170	INPUT PLATE CD 233	INPUT COVER PLATE FOR ANALOG RGB INPUT
C600173	FIX. TTL INPUT CD 233	DECORATIF COVER PLATE FOR TTL INPUTS

C620025	KNOB CV 33	KNOB FOR CONTROLS ON FRONTPANEL
C660020	UN. RGB 15M CF 33	RGB OUT AMPLIFIER
C660033	MAINBOARD	SEE CROSS REFENCE LIST
C660072	UN. PLUG INPUT CF 33	PART OF ANALOG RGB INPUT
C660074	UN. RGB. FLOAT. IN CF 33	PART OF ANALOG RGB INPUT
C660115	UN. CSB CD 233 - GD 233	FRONTPANEL CONTROL UNIT WHEN ANALOG RGB INPUT
C660117	UNIT AQUADAG CD 233	
C660118	UNIT MAINS CONNECT. CD 233	
C660119	UN. PLUG INPUT CD 233	
C660120	UN. CRT SOCKET N CD 233	SEE CROSS REFERENCE LIST
or C660121	UN. CRT SOCKET H CD 233	FOR WHICH ONE IS USED
C6601261	UN. ANALOG INPUT CD 233	PART OF ANALOG RGB INPUT
C660127	UN. TTL INPUT CD 233	TTL INPUT FOR CD 233
C660128	UN. CSB CD 233 TTL	FRONTPANEL CONTROL WHEN TTL INP.
C670013	SPO DEGAUSSING CD 233	DEGAUSSING COIL
C714590	COVERPLATE GD 33 02	TOP COVER GD 33
C713837	CRT PLATE CM 33	METAL LUG FOR CRT
C7146091	DPL CSB GD 233	DECORATIVE FRONT COVERPLATE GD 233
C714614	FOOT TURN GD 33	METAL BAR OF TURN FOOT SYSTEM
C714684	SIDE RIGHT CPL CM 33	METAL CHASSIS RIGHT PART
C714685	SIDE LEFT CPL CM 33	METAL CHASSIS LEFT PART
C714860	CAP CD 233	TOP COVERPLATE CD 233
C721215U	FOOTLATH GD 33	
C721315U	CONTAINER RGB GD 33	PLASTIC FRAME AROUND INPUT MOUNTED ON BACKPANEL PLATE
C721490	FOOT PIVOT	PLASTIC PART OF TURNFOOT
C721524	TOP CM 33	PLASTIC TOP PART OF CHASSIS
C721525	BOTTOM CM 33	PLASTIC BOTTOM PART OF CHASSIS FOR GD 233
C721554	FRF GD 33	FRONT BEZZEL FOR GD 233
C721561	SCREEN GD 33	
C721587	BOTTOM CD 233	PLASTIC BOTTOM PART FOR CD 233
C721588	FRF CD 233	FRONT BEZZEL FOR CD 233
C728041	GUIDING PC CM 33	PLASTIC GUIDING PART FOR PRINTED CIRCUITS

Fuse list CD 233 - GD 233 - CF 33

UNIT	DESCRIPTION			POSITION	REF. N°
TTL INPUT UNIT	RRCFFUL	2E2	J 0.25	SR 41	C1011049
RGB Ampl.	RRCF	100E	J 0.50	SR 5	C101224
C660020	RRCFF	22E	J 0.50	SR 7	C1012168
	RRCFFUL	220E	J 0.25	SR 15	C1011289
	RRCFFUL	220E	J 0.25	SR 24	C1011289
	RRCFFUL	220E	J 0.25	SR 33	C1011289
Main chassis	FUSE 2A SLOW			F1	C314138
120V	FUSE 2A SLOW			F2	C314138
	FUSE 2A FAST			F3	C314139
	RRCFF	1E5	J 0.25	SR 16 B	C1011026
	RRCFFUL	22E	J 0.25	SR 19	C1011169
	RRCFFUL	47E	J 0.25	SR 36	C1012209
	RRCFFUL	1K5	J 0.25	SR 42	C1012389
	RRCF	E47	J 0.25	SR 19 B	C1012947
	RRCFFUL	2E2	J 0.25	SR 63	C1011049
Main chassis	FUSE 2A SLOW			F1	C314116
220V	FUSE 2A SLOW			F2	C314116
	FUSE 1.25A FAST			F3	C314102
	RRCFF	1E5	J 0.35	SR 16 B	C1011026
	RRCFFUL	22E	J 0.25	SR 19	C1011169
	RRCFFUL	47E	J 0.50	SR 36	C1012209
	RRCFFUL	1K5	J 0.50	SR 42	C1012389
	RRCF	E47	J 0.50	SR 45 B	C1012947
	RRCFFUL	2E2	J 0.25	SR 63	C1011049

Description of the mainboard CF 33 CD 233

The mainboard contains all deflection circuits and the power supply circuits. The mainboard can be devided in following sections :

- mains filter and degaussing circuit
- switch mode power supply
- synchronisation separator
- vertical deflection circuit
- horizontal deflection circuit
- E.H.T. generator (extra high tension)

1. The mains filter and the degaussing circuit

The mains enters the monoboard via the two fuses F1 and F2 (2 A slow). The mains filter is formed by the capacitors C1, C2, C3 and coil L1. Resistor R1 is mounted as rushlimiter.

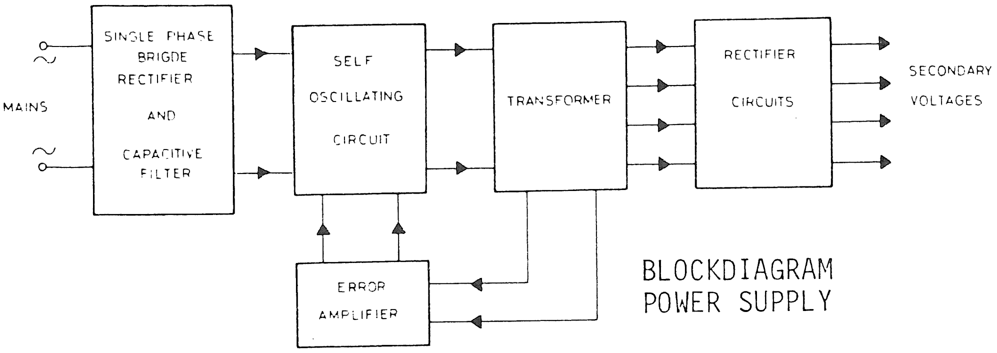
The degaussing coil is connected directly to mains via a PTC resistor. A few seconds after having switched the set on, the degaussing is deactivided by the PTC.

The capacitors short circuit the input for spikes (high frequency signals). The coil forms a high resistor for high frequency signals. In that way unwanted spikes are blocked.

2. The switch mode power supply

Introduction

The power supply is a mains isolated type, using a flyback convertor type transformer. The operation of this part is an unsynchronised circuit-breaker type. The frequency of the oscillation depends on the input voltage and the load. Due to the high working frequency, the transformer can be kept very small.
By use of a switch mode power supply one can construct a cost effective and highly efficient solution. To take care of mains deviation and load jumps, a regulation circuit has to be incorporated.


SINGLE PHASE BRIGDE RECTIFIER AND CAPACITIVE FILTER
MAINS
SELF OSCILLATING CIRCUIT
TRANSFORMER
RECTIFIER CIRCUITS
SECONDARY VOLTAGES
ERROR AMPLIFIER

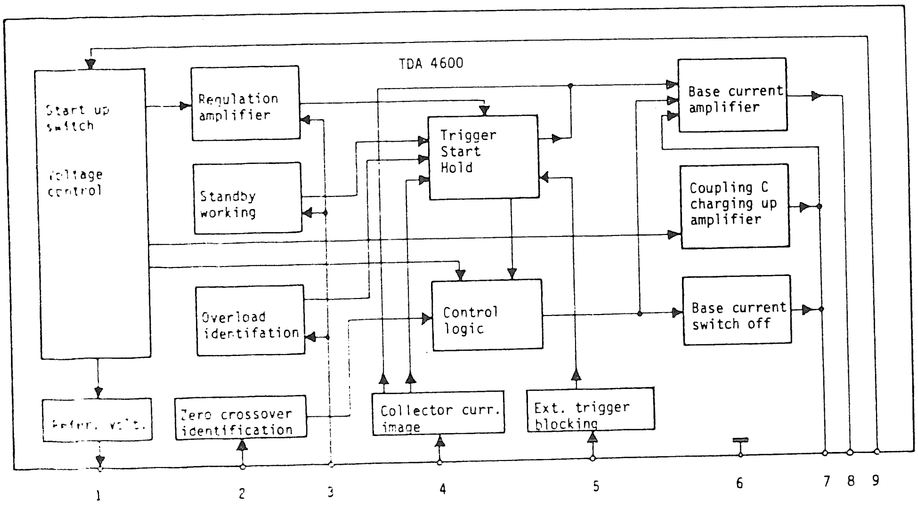
BLOCKDIAGRAM
POWER SUPPLY

The power supply is built around IC1 , TDA 4600. The IC controls and drives the switching transistor Q1. The IC1 also manages the start-up of the oscillation, controls the running during normal operation and provides protection when overload is detected. The IC is mounted in a SIL package with 9 pins.

The mains voltage coming from the mains filter is rectified by diodes D1, D2, D3 and D4. The capacitors C5,C6, C7and C8 short circuit the diodes when spikes are detected.
The rectified voltage is smoothed by capacitor C9. The resistor R14 decharges C9 when the unit is switched off (after 5RC=5min).

To descibe the individual features of the power supply, you find in this description, the blockdiagram of the IC 1 TDA 4600.

BLOCKDIAGRAM OF TDA 4600


TDA 4600
Start up switch
Voltage control
Regulation amplifier
Standby working
Overload identifation
Trigger Start Hold
Control logic
Base current amplifier
Coupling C charging up amplifier
Base current switch off
Refer. volt.
Zero crossover identification
Collector curr. image
Ext. trigger blocking
1
2
3
4
5
6
7
8
9

start-up operation

During the rise time of the mains voltage, a reference voltage is built up at pin 9 for future control functions. In parallel the coupling capacitor (C17) for the switching transistor is charged up. After reaching the necessary supply voltage of 12 Volts at pin 9, an internal reference is deblocked. This voltage of 4 Volts is also used as reference for the regulation amplifier at pin 1.

After reaching that stable status, the power supply is started an switched to the normal or regulated operation.

normal operation

Transformer information is taken and brought to the control logic of IC1. At pin 2 the zero-crossovers of the feedback coil (T1/pin 4-6) are counted. The feedback coil is set to +30V and its voltage rectified ; pin 3 evaluates the rectified amplitude variations of this voltage. By means of the voltage devider -which is connected to the reference voltage at pin 1 - all secondary voltages of the transformer are set.

The operational area of the power supply is defined by an RC link at pin 4 (C15-R2) and the resistors between pin 7 and pin 8 (R9-R10).

At pin 4 the link creates during the switch-on-phase of the power transistor, a sawtooth shaped voltage proportional to the collector current (collector current image).

According to this voltage the base current of the transistor is regulated according to the collector current. The maximal base current is set by the above mentioned transistors R9 and R10.

Via pin 5 the power switch can be blocked by overriding the trigger possibility. This feature may be of importance in the overlaod area.

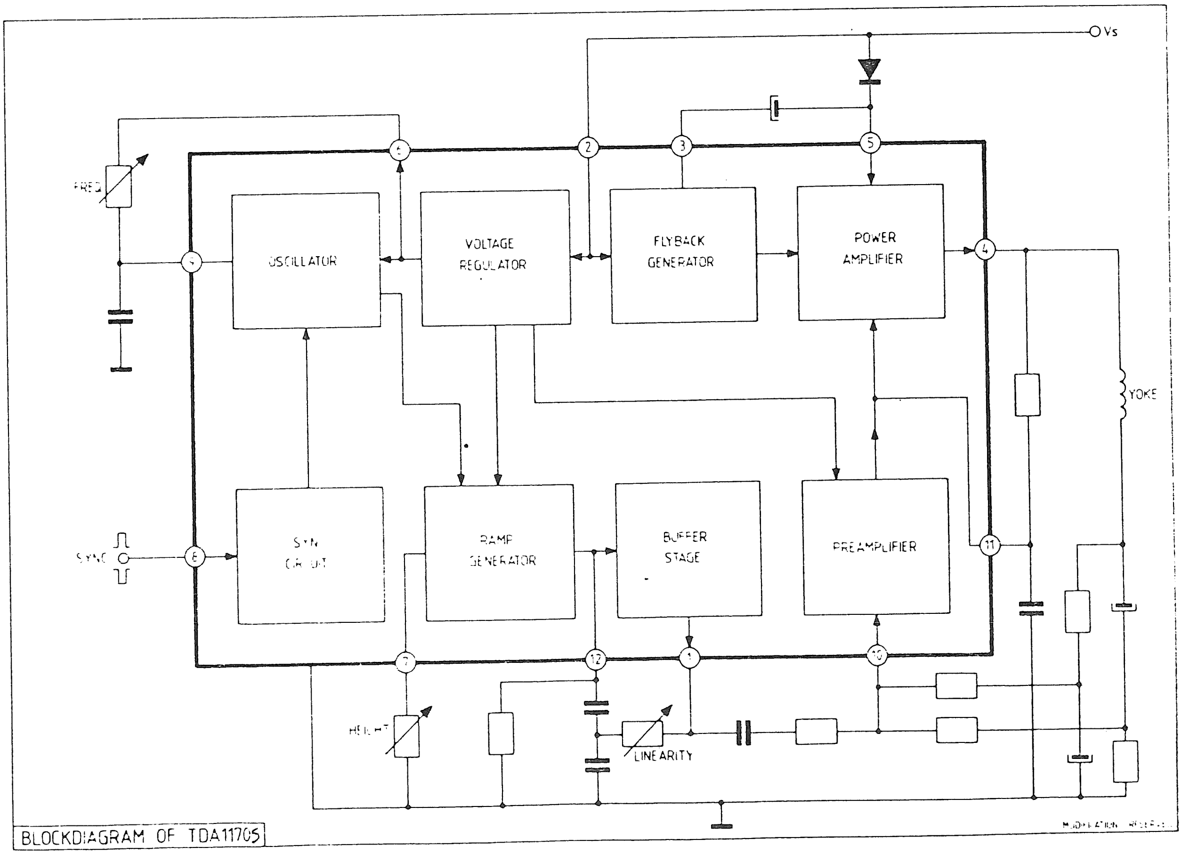
The available information, such as supply voltage, zerocrossovers, reference voltage and collector current are detected and prepared by the internal control logic, which also regulates the switch-on-time and frequency of the power transistor according to the wanted power.

IC2 separates vertical sync signal from the incoming signal and output vertical sync signal at pin 9. At pin 8 we find a jumper selection for selection between vertical sync mode.

IC2 also contains an oscillator which is controlled by two phase comparators comparing on the one hand the separated horizontal sync pulse and on the other hand the line flackback pulse from the horizontal deflection unit (pin 6). This to adjust the internal horizontal oscillator. The line driver output (pin 3) drives transistor Q2, which in turn drive the horizontal deflection transistor Q3 (for horizontal deflection description, see further description).

4. vertical deflection

The vertical deflection circuit is built around IC3 , the TDA 1170.
IC 3 is used to generate the vertical deflection current (output at pin 4).


Vs
FREQ
6
2
3
5
9
OSCILLATOR
VOLTAGE REGULATOR
FLYBACK GENERATOR
POWER AMPLIFIER
4
YOKE
SYNC
8
SYN CIRCUIT
RAMP GENERATOR
BUFFER STAGE
PREAMPLIFIER
11
7
12
1
10
HEIGHT
LINEARITY
MODIFICATION RESERVED

BLOCKDIAGRAM OF TDA1170S

The frequency of the internal oscillator is synchronised with the incoming sync siganl (pin 8) and may be adjusted with R78 ("V.FREQ"). Vertical amplitude and vertical linearity are directly adjustable with R77 an R73.
Pin 3 drives the blanking and clamping preamplifier built around IC4. IC4 drives in turn the blanking amplifier on the RGB amplifier board. A parabolic voltage for east-west correction is formed from the sawtooth waveform found on junction of R80 and C64 with the circuit containing transistors Q4, Q5, Q6 and Q7. Also in that part the trapezium disortion, correction and orthogonality correction are formed with transistor Q9 and are adjusted with R51 ("PAR") and R52 ("TRAP").

5. horizontal deflection

This part is equipped with the output transistor BU508 for the deflection and a diode modulator for east-west raster correction.
A non-linear cushion distortion is caused by the horizontal deflection coils, so a EW-correction should be modulated on the deflection current in order to obtain vertical lines in the screen.

Together with R40, R41 and C48, an internal diode in the voltage multiplier forms a clamping circuit. This circuit avoids ringing on the screen after lin flyback.
It als causes a decreasing of the internal resistance of the voltage multiplier so that variations of the picture dimensions are minimal.
The rectified scan voltage is used as Vg2 voltage.
The second secondary winding of the line transformer delivers positive and negative line flyback pulses.
The east-west correction is obtained by using a diode modulator which modulates the deflection current. The flyback pulses, whenever, are not modulated.
The diode modulator is driven on the bridge coil with a parabolic signal on field frequency coming from the driver circuit on the sync and vertical deflection unit.

6. E.H.T. generator

The EHT is generated by the voltage multiplier D22, which gets approximately 7 kV pulses from the line transformer.

Adjustment procedure Mainboard CF 33
CD 233

A. Power supply

CORRECT ADJUSTMENT OF THE POWER SUPPLY IS UTMOST IMPORTANT TO OBTAIN CORRECT E.H.T. VOLTAGE AND SAFE X-RAY RADIATION LIMITS

REPLACEMENT OF ANY COMPONENT OF THE SWITCH MODE POWER SUPPLY SECTION MUST BE FOLLOWED BY MEASURING +120 V AT THE PIN MARKED +HT.

IF VOLTAGE MEASURED IS NOT BETWEEN 118 AND 122 VOLT , READJUSTMENT OF THE SMPS BECOMES MANDATORY.

Adjust as following:
- Put a voltmeter (precision < 1 %) at the cathode of D13.
- Put a testpattern on the screen.
- Adjust R7 to +120 Volt (± 2 %).

B. Deflection circuits

1. Horizontal frequency

- short circuit the testpoint marked "TP1" and mounted near IC 2 (TDA 2593).
- adjust R31 (mounted near the IC 2 and marked "HOR FREQ") to get a minimal horizontal beat.
- remove the short circuit

2. Vertical frequency

- disconnect the vertical sync signal;

  when using separated vertical sync and horizontal sync:
  disconnect the input cable with vertical sync.
  when composite sync signal is used, remove the strap marked J6.

- adjust R78 (mounted at the rear of the printed circuit and marked "V FREQ") to obtain an upwards vertical beat of approximately 3 turns per second.
- Reconnect the vertical sync cable or reinstall the removable strap.

3. Horizontal phase

- put the brightness potentiometer completely clockwise so that the background (scanned field) lights up.
- adjust R18 (mounted near IC2 and marked "FASE") to center the picture to the scanned field.
- put the brightness potentiometer in its midposition.

4. Clamping pulse position (only for analogue versions)

- use a two channels oscilloscope
- connect the first channel to the horizontal sync signal (or composite signal or sync on green signal)
- connect the second channel of oscilloscope to the clamping pulse, both signals are available on connector C (mounted at the rear of the mainboard near the input unit).
- adjust potentiometer R97 (mounted near the transformer of the power supply) so that the leading edge of the sandcastle pulse starts just after the trailing edge of the sync signal.

5. Focus

- adjust now the sharpness with potentiometer "FOCUS ADJUST" on CRT SOCKET.

6. Geometry

- The CF33 / CD233 should be adjusted in underscan (four corners in display). Be sure you're using a good testpattern.

DIMENSIONS AND LINEARITY

- the vertical amplitude is adjusted at 205 mm ± 5 mm by means of R77 (mounted at the rear of the mainboard, marked "V AMP")
- the vertical linearity is adjusted with R73 (mounted rear R77 and marked "V LIN")
- the horizontal amplitude is adjusted at 270 mm ± 5 mm by means of R49 (mounted at the rear of the mainboard and marked "H AMP")

- only if you have noted deviation of the horizontal linearity, adjust L6 (mounted near the EHT transformer and marked "HOR LIN")
- center the picture tube on the screen:
  - horizontally by adjusting R43 (mounted near L6 and marked "HOR SHIFT")
  - vertically by adjusting R82 (mounted at the rear of the mainboard and marked "V SHIFT")

EAST-WEST PIN CUSHION CORRECTION

The deformation of the vertical lines of the picture at the left and right side of the screen can be:

- parabolic deformation: this can be corrected by means of R51 (mounted at the rear and marked "PAR")
- trapezoidal deformation: this is adjusted with R52 (mounted at the rear and marked "TRAP")

C. Colour adjustment

Readjust now the RGB amplifier as described in "ADJUSTMENT PROCEDURE RGB AMPLIFIER".

Adjustment procedure RGB out amplifier CF 33
CD 233

The colour amplifier is correctly set in the factory. It is recommended that - unless it is absolutely necessary - the potentiometers are left unchanged.

1. Switch off the set
2. Turn the cut-off (low lights) potentiometers P2, P4 and P6 completely anti clockwise (minimum light output).
3. Place the gain (high lights) potentiometers P1, P3 and P5 in their mid position.
4. Switch on the set with no picture on it and allow the monitor to warm up for at least 30 minutes.
5. Place for brightness potentiometer and the contrast potentiometer so that you get 7.0 Volt DC on their slider.

FOR ANALOGUE VERSIONS

6. Apply a black window (+ 55 mV video)
7. Fix the head of the colour analyser to the center of the screen (e.g. a Philips PM 5529 type, graduated for 9300K for the picture tube in question).
8. Shield the screen from incident light.
9. Adjust the G2 potentiometer on the CRT socket unit (marked "P2") so that the highest reading on one of the three meters of the colour analyser is 0.2 nit.
10. The three cut-off potentiometers P2, P4 and P6 are now adjusted to give 1.0 nit for each colour.

11. Apply a white window (+ 700 mV video).
12. Adjust the gain potentiometers P1, P3 and P5 to give 40 nit for high resolution tubes and medium resolution tubes; and 30 nit for long persistence tubes.

Adjustment procedure RGB out amplifier CF 33
CD 233

The colour amplifier is correctly set in the factory. It is recommended that - unless it is absolutely necessary - the potentiometers are left unchanged.

1. Switch off the set
2. Turn the cut-off (low lights) potentiometers P2, P4 and P6 completely anti clockwise (minimum light output).
3. Place the gain (high lights) potentiometers P1, P3 and P5 in their mid position.
4. Switch on the set with no picture on it and allow the monitor to warm up for at least 30 minutes.
5. Place for brightness potentiometer and the contrast potentiometer so that you get 7.0 Volt DC on their slider.

FOR ANALOGUE VERSIONS

6. Apply a black window (+ 55 mV video)
7. Fix the head of the colour analyser to the center of the screen (e.g. a Philips PM 5529 type, graduated for 9300K for the picture tube in question).
8. Shield the screen from incident light.
9. Adjust the G2 potentiometer on the CRT socket unit (marked "P2") so that the highest reading on one of the three meters of the colour analyser is 0.2 nit.
10. The three cut-off potentiometers P2, P4 and P6 are now adjusted to give 1.0 nit for each colour.

11. Apply a white window (+ 700 mV video).
12. Adjust the gain potentiometers P1, P3 and P5 to give 40 nit for high resolution tubes and medium resolution tubes; and 30 nit for long persistence tubes.

13. Check the tracking on the colour analyser by adjusting the contrast from 40 (30) nit to 0.2 nit and seeing that the movement of the three meters coincide. If not repeat the adjustments starting on 10.

FOR TTL COMPATIBLE VERSIONS

6. Connect only the sync to the input unit
7. Disconnect connector B ("CON B") from the RGB amplifier
8. Fix the head of the colour analyser to the center of the screen (e.g. PM 5529 type graduated for 9300K for the picture tube in question).
9. Shield the screen from incident light.
10. Select the 1 nit scale on the colour analyser.
11. Adjust the G2 potentiometer on the CRT socket unit (marked "P2") until you just remark deflection on one of the three meters of the colour analyser.
12. Reconnect the wire harness to connector B ("CON B")
13. Adjust the brightness until you get 0.2 nit on one of the three meters.
14. Adjust now the cut-off potentiometers to give 0.2 nit for both other colours (P2 for RED, P4 for BLUE and P6 for GREEN).
15. Put a white screen on the set via the TTL input unit.
16. Adjust the three gain potentiometers P1, P3 and P5 to give 80 nit.
17. Check the tracking on the colour analyser by adjusting the contrast from 0.2 nit to 80 nit and seeing that the movement of the meters of the colour analyser coincide. If not repeat the adjustments starting on 14.

TTL input unit CD 233

C660127

Information about this unit can be found in the technical description of the CF 33, second part of this manual (see "TTL input unit"). The only difference is that the control potentiometers for brightness and contrast are mounted now on the control panel C660128.

TTL input CD 233 - HR - TTL I (for IBM personal computer)

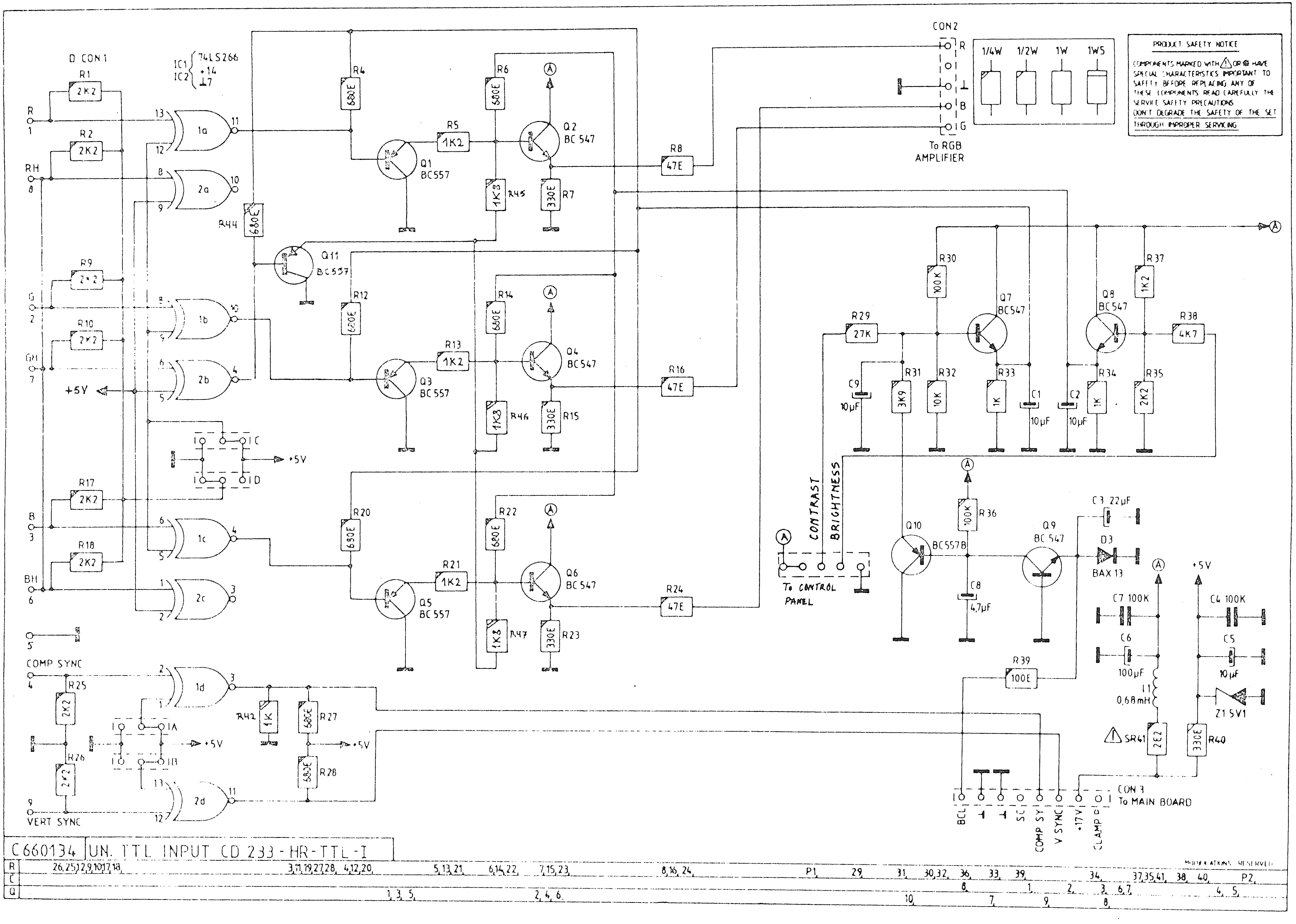
C660134

This input unit is compatible with the IBM personal computer. Schematic diagram on next page.

Floating analog input unit

C660072 & C660074 & C660126(1)

Information about these units can be found in the technical description of the CF 33, second part of this manual (see "floating analog input"). The only difference is that the control potentiometers for brightness and contrast are mounted now on the control panel C660115.


D CON1
R 1
RH 8
G 2
GH 7
B 3
BH 6
5
COMP SYNC 4
VERT SYNC 9
R1 2K2
R2 2K2
R9 2K2
R10 2K2
R17 2K2
R18 2K2
R25 2K2
R26 2K2
+5V
IC1 IC2 74LS266 +14 ⊥7
1a
2a
1b
2b
1c
2c
1d
2d
1A
1B
1C
1D
R4 680E
R6 680E
R12 680E
R14 680E
R20 680E
R22 680E
R44 680E
R27 680E
R28 680E
R42 1K
R5 1K2
R13 1K2
R21 1K2
R45 1K8
R46 1K8
R47 1K8
R7 330E
R15 330E
R23 330E
R8 47E
R16 47E
R24 47E
Q1 BC557
Q3 BC557
Q5 BC557
Q11 BC557
Q2 BC547
Q4 BC547
Q6 BC547
Q7 BC547
Q8 BC547
Q9 BC547
Q10 BC557B
A
CON2
R
⊥
B
G
To RGB AMPLIFIER
1/4W
1/2W
1W
1W5
R29 27K
R30 100K
R31 3K9
R32 10K
R33 1K
R34 1K
R35 2K2
R37 1K2
R38 4K7
C1 10µF
C2 10µF
C9 10µF
CONTRAST
BRIGHTNESS
To CONTROL PANEL
R36 100K
C8 4,7µF
C3 22µF
D3 BAX 13
R39 100E
C7 100K
C6 100µF
L1 0,68mH
SR41 2E2
+5V
C4 100K
C5 10µF
Z1 5V1
R40 330E
CON 3 To MAIN BOARD
BCL
⊥
⊥
SC
COMP SY
V SYNC
+17V
CLAMP
MODIFICATIONS RESERVED
R 26,25,1,2,9,10,17,18, 3,11,19,27,28, 4,12,20, 5,13,21, 6,14,22, 7,15,23, 8,16,24, P1, 29, 31, 30,32, 36, 33, 39, 34, 37,35,41, 38, 40, P2,
C 8, 1, 2, 3, 6,7, 4, 5,
Q 1,3,5, 2,4,6, 10, 7, 9, 8,

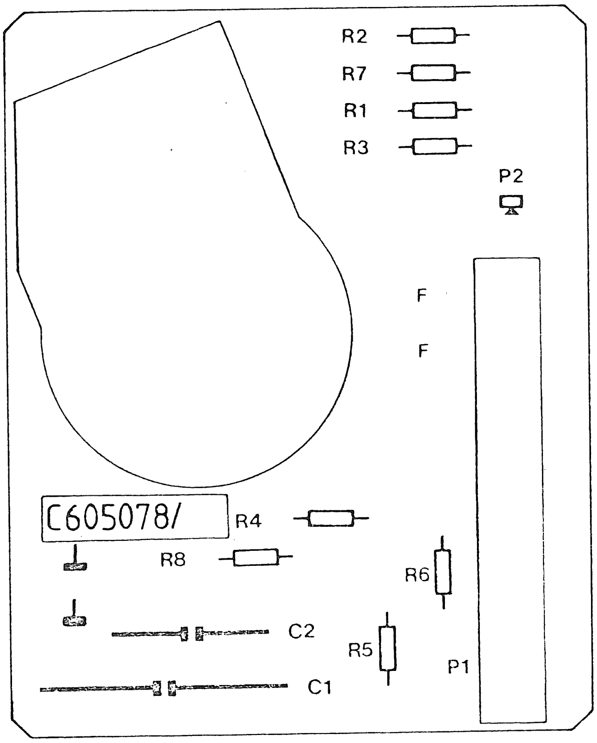
PRODUCT SAFETY NOTICE

COMPONENTS MARKED WITH ⚠ OR ● HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS READ CAREFULLY THE SERVICE SAFETY PRECAUTIONS. DON'T DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING

C660134 UN. TTL INPUT CD 233 - HR-TTL-I

CRT Socket Unit N CD 233

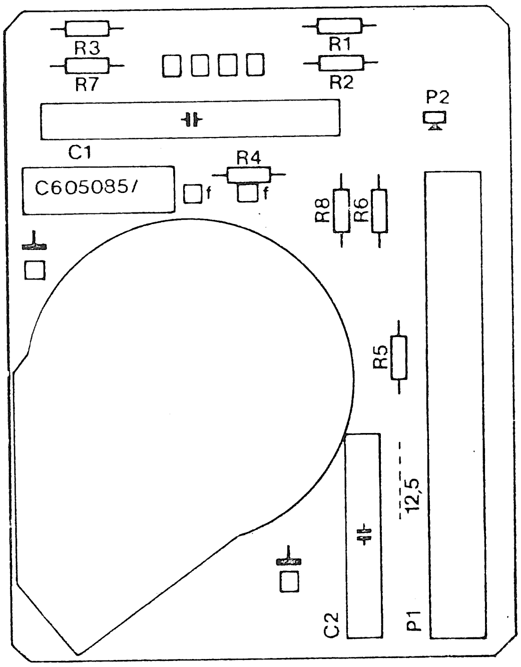
C660120



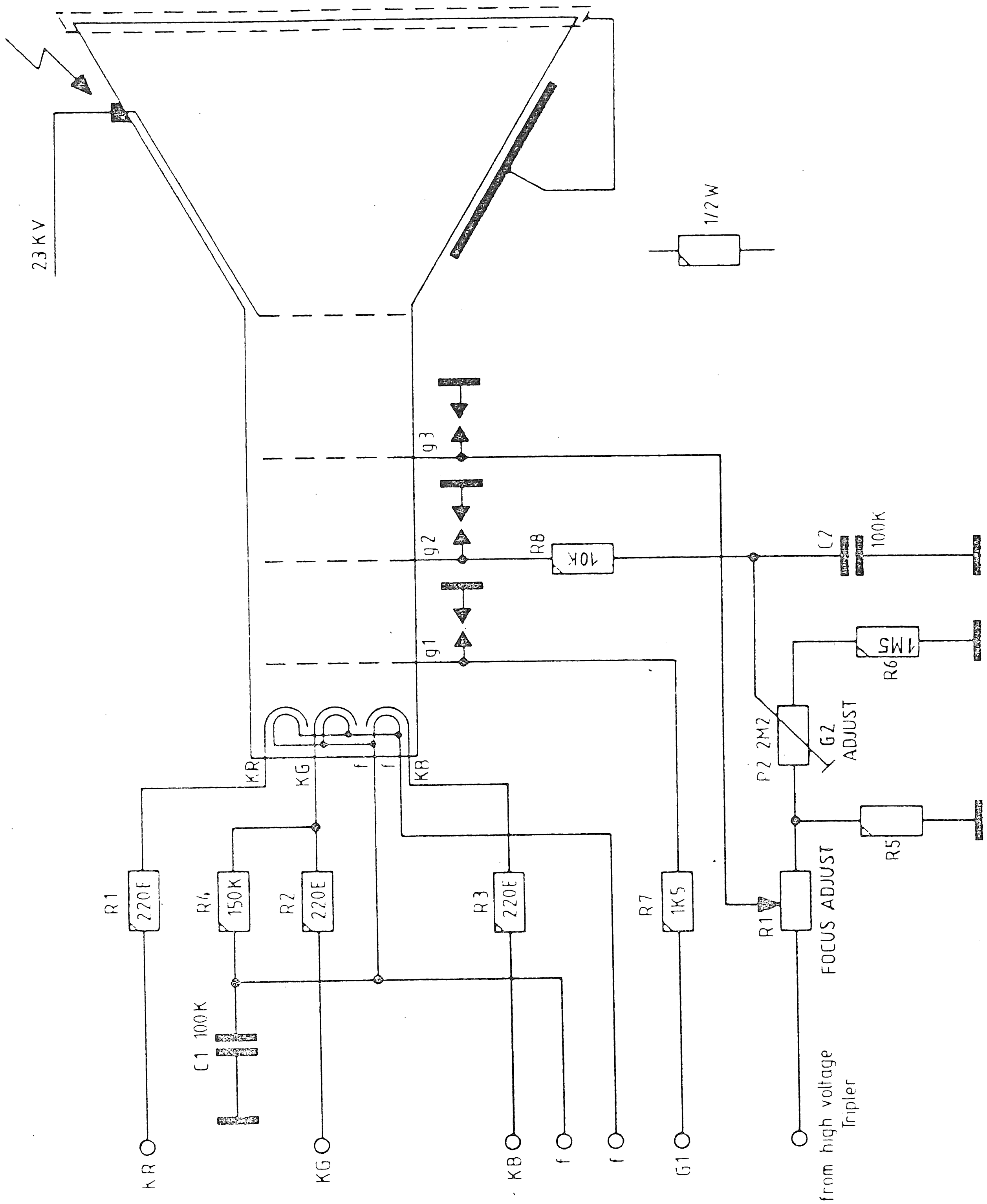
REF.NR.	POSITION	DESCRIPTION
C114874	C1	CPO AX100K M 630
C114602	C2	S HV 47K M 1000
C107607	P1	RPFOCUS 24M K 3,80
C1062151	P2	RTCAPPV 2M2 M 0,20
C605078	PC	PC -C660120 01
C101228	R1	RRCF 220E J 0,50
C101228	R2	RRCF 220E J 0,50
C101228	R3	RRCF 220E J 0,50
C101262	R4	RRCF 150K J 0,50
C104656	R6	RRHV 1M2 J 0,50
C101238	R7	RRCF 1K5 J 0,50
C101248	R8	RRCF 10K J 0,50
C311034	001	TUBPICSOC+SG11-13KV

CRT Socket Unit H CD 233

C660121



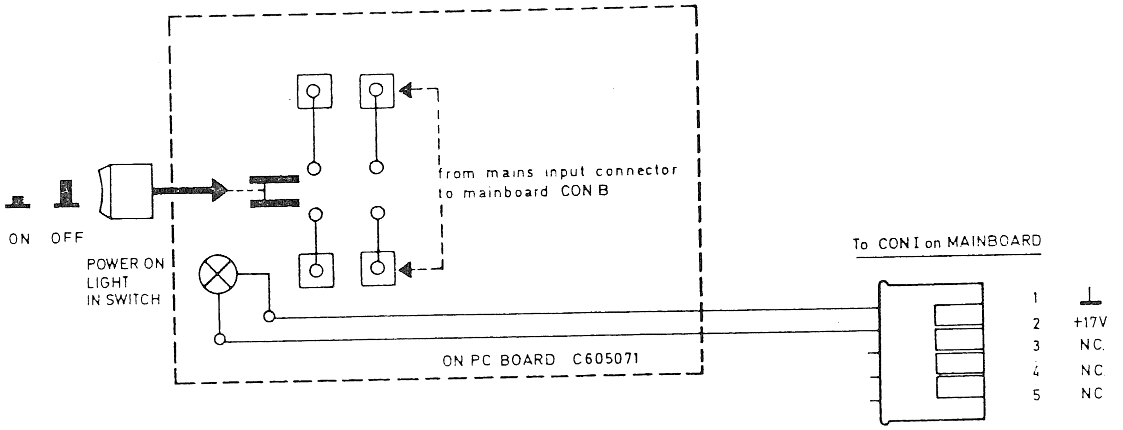
REF.NR.	POSITION	DESCRIPTION
C114874	C1	CPO AX100K M 630
C114602	C2	S HV 47K M 1000
C107607	P1	RPFOCUS 24M K 3,80
C1062151	P2	RTCAPPV 2M2 M 0,20
C605085	PC	PC -C660121 01
C101228	R1	RRCF 220E J 0,50
C101228	R2	RRCF 220E J 0,50
C101228	R3	RRCF 220E J 0,50
C101262	R4	RRCF 150K J 0,50
C104656	R6	RRHV 1M2 J 0,50
C101238	R7	RRCF 1K5 J 0,50
C101248	R8	RRCF 10K J 0,50
C311034	001	TUBPICSOC+SG11-13KV

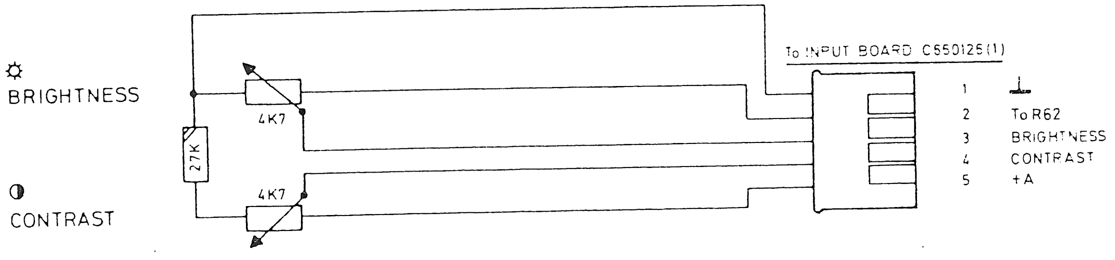

23 KV
1/2 W
g3
g2
g1
R8
10K
C7
100K
R6
1M5
P2 2M2
G2 ADJUST
R5
R1
FOCUS ADJUST
KR
KG
f
f
KB
R1
220E
R4
150K
R2
220E
R3
220E
R7
1K5
C1 100K
KR
KG
KB
f
f
G1
from high voltage Tripler

C660120, C660121

Unit CSB CD 233 (for TTL input)

C660128


ON
OFF
POWER ON LIGHT IN SWITCH
from mains input connector to mainboard CON B
ON PC BOARD C605071
To CON I on MAINBOARD
1 ⊥
2 +17V
3 N.C.
4 NC
5 NC


☼ BRIGHTNESS
◑ CONTRAST
4K7
27K
4K7
To INPUT BOARD C650125(1)
1 ⊥
2 To R62
3 BRIGHTNESS
4 CONTRAST
5 +A

UNIT CSB CD 233 TTL INPUT

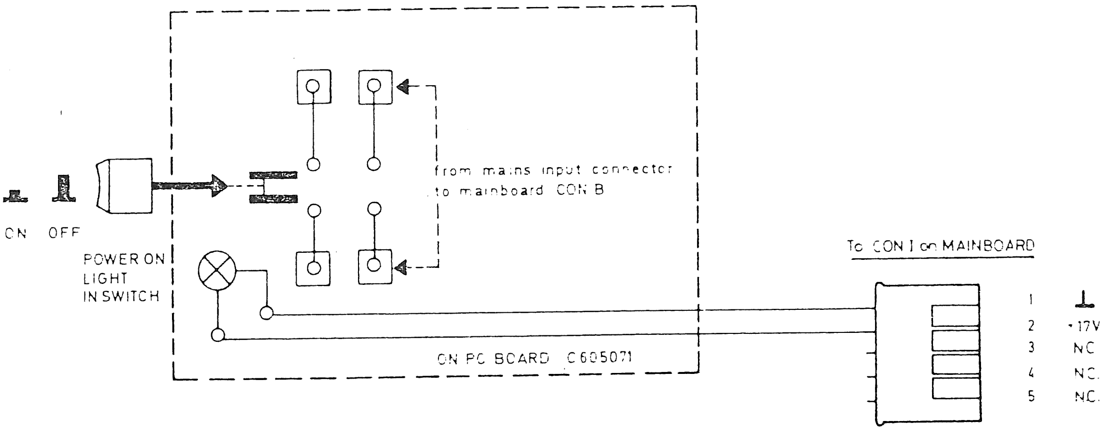
PARTS LIST

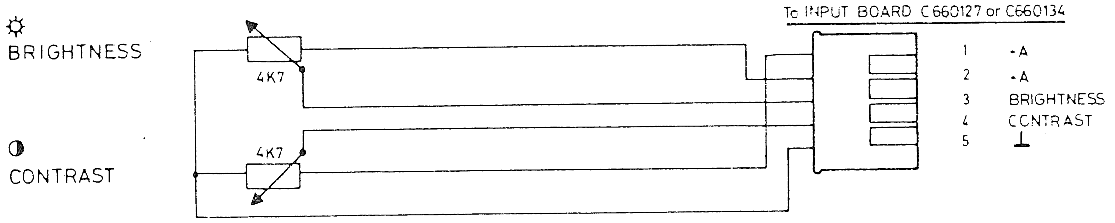
PART NR. C660128

REF. NR.	QUANTITY	DESCRIPTION
C107130	2	RPCAM.H 4K7 MA POTENTIOMETER
C313291	2	CONFOWTE CISC 5CASE
C313454	2	CONMOBTE TABP 1.187
C3134541	2	CIN MOB .250 P1
C324781	1	SWITCH MAINS N30X
C600139	1	METAL MOUNTING PLATE
C600153	1	PC BOARD FOR SAFETY
C605071	1	PCB POWERSWITCH
V131220	-	INCANDESCENT LAMP (SPARE PART OF MAINS SWITCH)
C101153	1	RRCF 27K J 0.25

Unit CSB CD 233 - GD 233 (for analog input)

C660115


ON
OFF
POWER ON LIGHT IN SWITCH
from mains input connector to mainboard CON B
ON PC BOARD C605071
To CON I on MAINBOARD
1 ⊥
2 +17V
3 NC
4 NC.
5 NC.

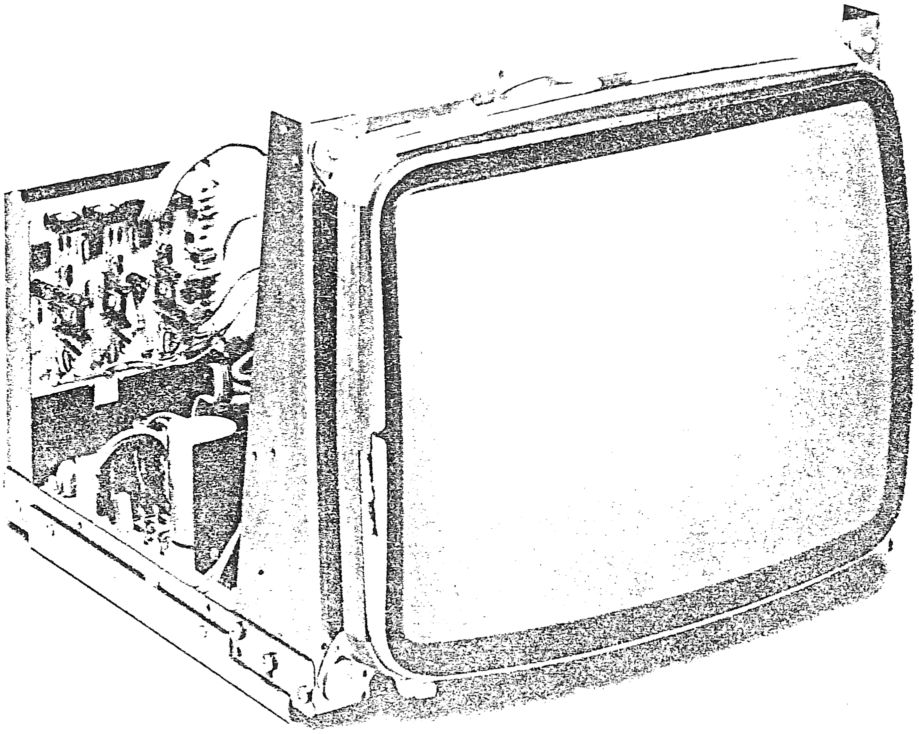

☼
BRIGHTNESS
◑
CONTRAST
4K7
4K7
To INPUT BOARD C660127 or C660134
1 +A
2 +A
3 BRIGHTNESS
4 CONTRAST
5 ⊥

UNIT CSB CD 233 ANALOG INPUT

PARTS LIST

PART NR. C660115

REF. NR.	QUANTITY	DESCRIPTION
C107130	2	RPCAM.H 4K7 MA POTENTIOMETER
C313291	2	CONFOWTE CISC 5CASE
C313454	2	CONMOBTE TABP 1.187
C3134541	2	CIN MOB .250 P1
C324781	1	SWITCH MAINS N30X
C600139	1	METAL MOUNTING PLATE
C600153	1	PC BOARD FOR SAFETY
C605071	1	PCB POWERSWITCH
V131220	-	INCANDESCENT LAMP (SPARE PART OF MAINS SWITCH)
C101153	1	RRCF 27K J 0.25



CF 33

120/220 V

TECHNICAL MANUAL

Barco Video & Communications n.v.

COLOR DISPLAY FRAME CF 33		

Service Safety Precautions

WARNING : X-RADIATION

X - RADIATION CAN BE CAUSED IF CRITICAL COMPONENTS ARE REPLACED BY NON-CONFORM COMPONENTS. THESE COMPONENTS ARE MARKED IN THIS SERVICE MANUAL BY AN ✳

WARNING : SAFETY

ELECTRIC SHOCK OR FIRE HAZARD CAN BE CAUSED IF CRITICAL COMPONENTS ARE REPLACED BY NON-CONFORM COMPONENTS. THESE COMPONENTS ARE MARKED IN THIS MANUAL BY A ⚠ SIGN.

REPLACE WITH CONFORM TYPES ONLY !

1. Comply with all caution and safety-related notes on or inside the instrument cabinet, on the chassis, or on the picture tube.
2. When service is required, maintain correct lead dress and parts placement. Extra precaution should be taken to assure proper lead dress in the High Voltage circuit area.

   Where a malfunction has occured, those components or circuits that indicate evidence of abnormality should be replaced or corrected. Always use the manufacturer's safety specified replacement components.
3. Do not remove, install or handle the picture tube in any manner unless shatter-proof goggles are worn. People not so equipped should be kept away while picture tubes are handled. Keep picture tube away from the body while handling.
4. Protective shields are provided on this chassis for the protection of both the service technician and the customer.

   Protection shields removed for servicing convenience must be correctly re-installed and ANY MISSING SHIELD MUST BE REPLACED. DO NOT OPERATE THIS INSTRUMENT WITHOUT THE PROTECTIVE SHIELDS IN POSITION AND PROPERLY SECURED.
5. After any service intervention, the service technician must be sure that no protective device built into the instrument by the manufacturer has become defective, or inadvertently defeated during servicing. Therefore, the following checks are recommended for the continued protection of the customer and service technician.

GROUNDING CONTINUITY TEST

— remove mains plug from wall outlet.

— with an ohm-meter in its lowest resistance range, measure resistance between the grounding prong of the mains plug and all accessible conductive parts.
THE METER MUST READ ZERO OHM

— the mains plug still being removed from the wall outlet, switch on the instrument.

— with an ohm-meter in its highest resistance range, measure resistance between the grouding prong of the mains plug and the two other prongs of the mains plug.
BOTH METER READINGS MUST BE MORE THAN 5 MEGOHM.

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE THE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND CORRECTIVE ACTION MUST BE TAKEN BEFORE RETURNING THE INSTRUMENT TO THE CUSTOMER.

X-RADIATION AND HIGH VOLTAGE LIMITS

The primary source of X-radiation in solid state display units is the picture tube. The picture tube is specially constructed to limit X-radiation emissions. The shields and mounting hardware for picture tubes have an X-radiation protection function and must be properly in place.
For continued X-radiation protection, the replacement tube must be the same type as the original, including suffix letter. High voltage is maintained within specified limits by the use of close tolerance safety related components / adjustments in the power supply circuit. Refer to the Technician X-radiation warning note on the Chassis Schematic and Instrument Labels in the Basic Service Data for specific high voltage limits of each chassis and X-radiation Protection Circuits. If high voltage exceeds specified limits, check each component specified on the chassis schematic diagram and take necessary corrective action.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in display units have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by then necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Data and its Supplements and Bulletins. Electrical components having such features are identified by ⚠ or ✳ on the schematics and on the parts list in this Data and its Supplements and Bulletins. The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the parts list in this Data and its Supplements and Bulletins, may create shock, fire, or ejessive X-radiation.

NOTE FOR USERS IN THE UNITED KINGDOM :

IMPORTANT :

The wires of the mains lead are coloured in accordance with the following code :

Green and Yellow : EARTH
Blue : NEUTRAL
Brown : LIVE
Plug fusing value : 5 A

As the colours of the wires in the mains lead of this apparatus may not correspond with the colotred markings identifying the terminals in your plug, proceed as follows :

— The wire which is coloured Green and Yellow must be connected to the terminal in the plug which is marked by the letter E or by the safety earth symbol ⏚ or coloured green and yellow.

— The wire which is coloured Blue must be connected to the terminal which is marked with the letter N or coloured black.

— The wire which is coloured Brown must be connected to the terminal which is marked with the letter L or coloured red

WARNING : This apparatus must be earthed.

Introduction

To help you with the repairing of your colour display frame CF 33 we made this technical manual.

This manual contains technical information of our colour data display frame CF 33 in all different versions : high, medium resolution, analog input or TTL input.

The technical specifications of the CF 33 are given on the pages TM004a, TM004b and TM004c.
How the colour display frame is compound and the functional description can be found on pages TM005 and TM006.
Dimensions and boardlocations are also taken in this manual.

Modifications and upgradings will be announced by means of info T's.

Please note in all your correspondence concerning your display the type and partnumber.

Table of Contents

Technical manual CF 33

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The different CF33 types TM003
Technical specifications of the CF33 TM004
Blockdiagram TM005
Functional description TM006
Partslists TM007
Where we can find the differents boards, dimensions TM008

RGB amplifier C660020
TTL amplifier C660023
Floating analog input C6600241, C660072, C660074, C3490225
CRT socket HR N C660022
CRT socket HR H C660030
CRT socket SR C660031
Main chassis (print lay-out)
Mainboard 120V HR-TTL(-LP) C660026
Mainboard 120V MR-TTL C6600261

Mainboard 220V HR-TTL(-LP) C660027
Mainboard 220V MR-TTL C6600271

Mainboard 120V HRA C660032
Mainboard 120V MRA C6600321

Mainboard 220V HRA C660033
Mainboard 220V MRA C6600331

Codes to partslists

Notes

The different CF 33 types

FOR MAINS VOLTAGE 120Vac

CF 33 HR-TTL 120 V

Is a colour chassis frame with TTL compatible inputs and should be fed with 120 V AC. It contains a 14" (33 cm) high resolution picture tube.

CF 33 HR-TTL-LP 120 V

Is a colour chassis frame with TTL compatible inputs and should be fed with 120 V AC. It contains a 14" (33 cm) high resolution picture tube with long persistence.

CF 33 MR-TTL 120 V

Is a colour chassis frame with TTL compatible inputs and should be fed with 120 V AC. It contains a 14" (33 cm) medium resolution picture tube.

CF 33 HR-A 120 V

Is a colour chassis frame with analog inputs and should be fed with 120 V AC. It contains a 14" (33 cm) high resolution picture tube.

CF 33 HR-A-LP 120 V

Is a colour chassis frame with analog inputs and should be fed with 120 V AC. It contains a 14" (33 cm) high resolution picture tube with long persistence.

CF 33 MR-A 120 V

Is a colour chassis frame with analog inputs and should be fed with 120 V AC. It contains a 14" (33 cm) medium resolution picture tube.

FOR MAINS VOLTAGE 220Vac

CF 33 HR-TTL 220 V

Is a colour chassis frame with TTL compatible inputs and should be fed with 220 V AC. It contains a 14" (33 cm) high resolution picture tube.

CF 33 HR-TTL-LP 220 V

Is a colour chassis frame with TTL compatible inputs and should be fed with 220 V AC. It contains a 14'' (33 cm) high resolution picture tube with long persistence.

CF 33 MR-TTL 220 V

Is a colour chassis frame with TTL compatible inputs and should be fed with 220 V AC. It contains a 14'' (33 cm) medium resolution picture tube.

CF 33 HR-A 220 V

Is a colour chassis frame with analog inputs and should be fed with 220 V AC. It contains a 14'' (33 cm) high resolution picture tube.

CF 33 HR-A-LP 220 V

Is a colour chassis frame with analog inputs and should be fed with 220 V AC. It contains a 14'' (33 cm) high resolution picture tube with long persistence.

CF 33 MR-A 220 V

Is a colour chassis frame with analog inputs and should be fed with 220 V AC. It contains a 14'' (33 cm) medium resolution picture tube.

CONTROLS :

- Brightness and Contrast adjustment mounted at the rear.
  On request remote control possible.
- Optional : mains socket and power switch.

TECHNICAL SPECIFICATIONS :

Scanning systems :

525 lines 60 Hz interlaced
625 lines 50 Hz interlaced

Power :

- Mains voltage :
  120 V + 15% / − 20% or
  220 V + 15% / − 20%
- Power consumption :
  60 W nominal
- Mains frequency :
  48 to 60 Hz
- Mains isolated switched mode power supply.

Inputs :

1. Digital
   - RGB TTL level (positive or negative logic selectable with a jumper).
   - Input via a cannon D-type socket, 9 pins.
   - Half tone input level standard (27 colors digital selectable).
   - Sync :
     - Composite TTL level (pos. or neg. - jumper selectable).
       Or line and field sync, positive going TTL level.
     - Separated vertical and horizontal sync selectable by means of a jumper.
2. Analog RGBS non floating (3 versions).
   - Red :
     non composite 0.7 Vpp +/− 6 dB positive.
   - Green :
     non composite (external sync) 0.7 Vpp.
     +/− 6 dB positive.
     composite (sync on green) 1.0 Vpp +/− 6 dB.
     (0.7 V video + 0.3 V sync).
   - Blue :
     non composite 0.7 Vpp +/− 6 dB positive.
   - Sync :
     external or sync on green mode selectable by means of a switch.
     external sync : negative 4 Vpp +/− 6 dB.
     depending on order the CF 33 is equiped with one of following inputs :

a) Input with one connector
   - Standard 75 ohm termination.
   - Ext/Int sync jumper selectable.
   - Time constant jumper selectable.

b) BNC input
   - Standard 75 ohm termination.
   - Ext/Int sync selectable by means of a switch.
   - Time contant jumper selectable.

c) BNC input looped through output.
   - All inputs are looped through output with high impedance or terminated with 75 ohm by means of a switch.
   - Ext/Int sync selectable by means of a switch.
   - Time constant jumper selectable.

3. Analog floating inputs (looped through) optional.

RGB performance :

- Frequency response.
  15 kHz to 15 MHz + 1/− 3 dB gradual roll off.

Synchronisation :

- Horizontal scanning :
  Horizontal retrace time less than 10 uS.
- Vertical scanning :
  Vertical retrace time less than 1 mS.
- RS 170 compatible.

Display performance :

- Picture tube : 14" (33 V), 33 cm — in line gun — 90°.
  W x H : 9 1/2" x 7" (24 cm x 18 cm).
- Overscan possible by adjusting vertical and horizontal amplitude controls.
- Deflection linearity : less than 2% picture height on any point of picture tube.
- High resolution, dotted screen, in line gun, shadow mask, auto convergent black matrix CRT.
  Pitch = 0.31 mm.
  Phosphor : P.22.
  Resolution : 720 x 540 pixels.
  Character display capacity : 80 char x 25 rows.
  > 2000 characters.
  Misconvergence : < 0.4 mm in center
  < 0.8 mm on axes
  < 1 mm over the whole screen
  LP on request.

- Medium resolution, dotted screen, in line gun, shadow mask, auto convergent black matrix CRT.
  Pitch = 0.44 mm.
  Phosphor : P.22
  Resolution : 580 x 430 pixels
  Character display capacity : 64 char x 25 rows.
  > 1600 characters.
  Misconvergence : < 0.4 mm in center
  < 0.8 mm on axes
  < 1 mm over the whole screen
- Aspect ratio :
  Adjusted for 4/3 aspect ratio (1/1 possible — jumper selectable).
- Underscan :
  Standard 4 corners in display.

GENERAL

Warm up period :
30 minutes to meet specs.

Degaussing :
Automatic degaussing on switch-on.
Mains driven.

X-ray radiation :
< 0.1 mR/hour at 2" (5 cm) from any external surface of the display. Complies with the DHHS rules and regulations as of the date of manufacturing.

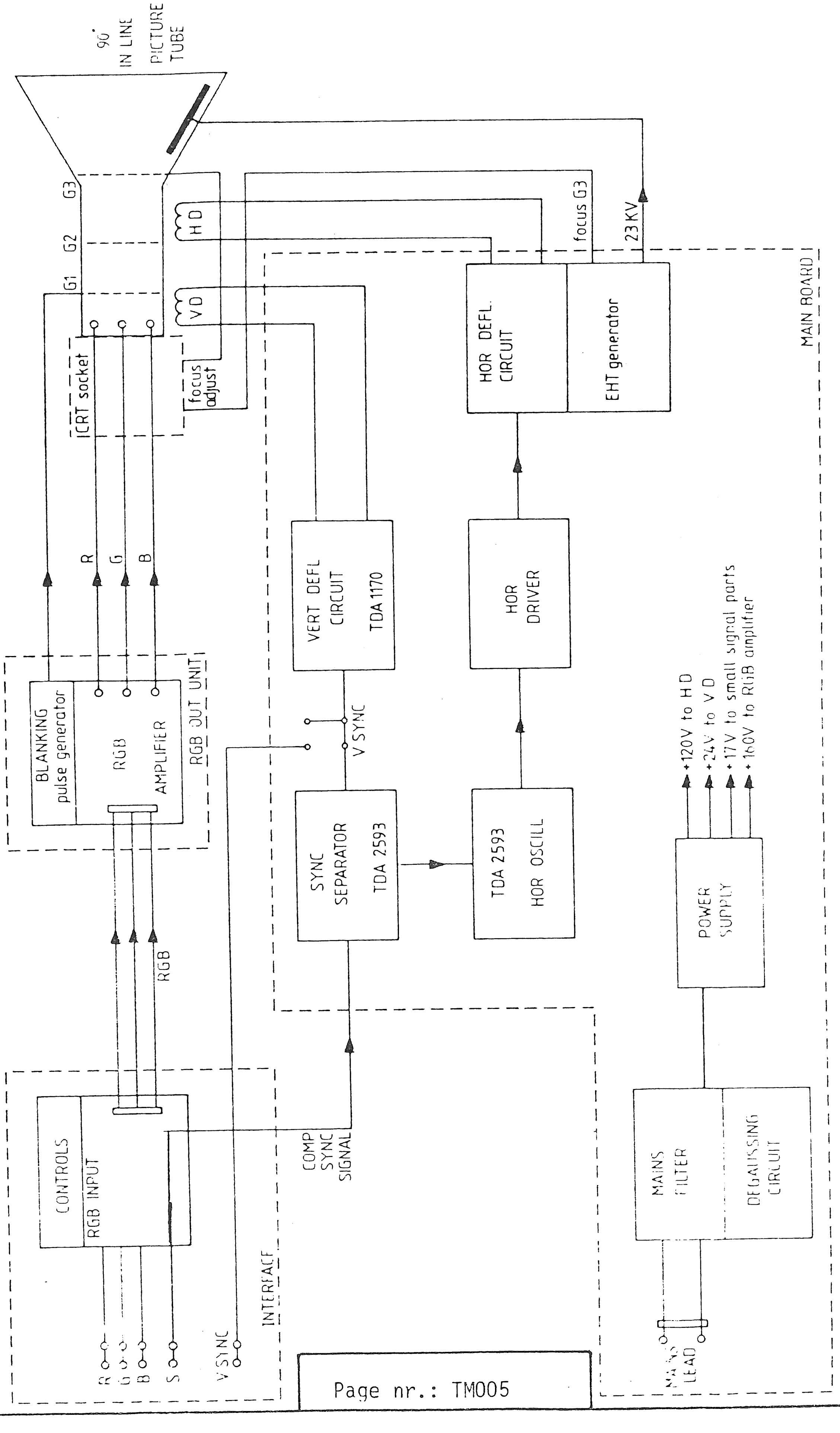
Dimensions (see also pages TM008) :
H 10 13/16" x W 13 3/8" x D 15 3/4"
H 275 x W 340 x D 400 mm.

Environment :
0 - 40° C.
Humidity : 10 - 90% non condensing.

Weight :
25 lb.
11,5 kg.

BARCO INDUSTRIES

Blockdiagram



90° IN LINE PICTURE TUBE
G1
G2
G3
H D
V D
CRT socket
focus adjust
focus G3
23 KV
HOR DEFL. CIRCUIT
EHT generator
MAIN BOARD
R
G
B
VERT DEFL CIRCUIT TDA 1170
HOR DRIVER
BLANKING pulse generator
RGB AMPLIFIER
RGB OUT UNIT
V SYNC
SYNC SEPARATOR TDA 2593
TDA 2593 HOR OSCILL
+120V to H D
+24V to V D
+17V to small signal parts
+160V to RGB amplifier
POWER SUPPLY
RGB
CONTROLS
RGB INPUT
COMP SYNC SIGNAL
MAINS FILTER
DEGAUSSING CIRCUIT
INTERFACE
R
G
B
S
V SYNC
MAINS LEAD

Page nr.: TM005

BLOCKDIAGRAM | CF 33

CF 33 Functional Description

The color display frame CF 33 has been constructed around four units : the mainboard, the CRT-socket, the input unit and the RGB amplifier. In these pages we will describe the flow of the most important signals in the CF 33.

The red, green and blue signals enter via the input module (depending on kind of input module : digital or analog signals). These signals can be terminated (75 Ohm) by means of the termination switches mounted on the input unit.

Floating input signals are amplified by means of differential amplifiers, non floating input signals are amplified and are adjustable in brightness and contrast. Either the (composite) green signal or the sync input signal — depending on the position of the green/ext switch — is connected to the vertical deflection part on the mainboard as sync signal. The pre-amplified R, G and B signals go to the RGB amplifier.

Note that the vertical and horizontal sync can be fed separately to the CF 33. Summing up : sync can be inputted by a composite sync signal, by a composite sync on the green input signal or by separated vertical and horizontal sync.

The mainboard contains all deflection and power supply circuits.
In fact, we can devide the mainboard in following sections :

- sync separator
- vertical deflection circuit
- horizontal deflection circuit
- EHT Generator
- mains filter and degaussing circuit
- switched mode power supply.

The synchronisation pulses enter via the input unit. They are separated by IC2 TDA 2593 (in at pin 9). The vertical sync pulses leave the IC via pin 8. The vertical sync pulses trigger the vertical oscillator IC3 TDA 1170 (in at pin 8). The horizontal drive pulses circuit (output at pin 3) drives the line output transistor Q2 in the horizontal deflection part.

The IC2 TDA 2593 further contains the horizontal oscillator and a PLL circuit which synchronise the position of the horizontal flyback pulses on pin 6.

Via transformer T 2 we get a perfect driving of the line deflection transistor Q3. The line deflection output transistor Q3 switches the deflection voltage across the deflection coil and the line output transformer.

Out the transformer T3 we derive :
- flyback pulses
- filament voltage for CRT
- the 8 kV pulses from this transformer are tripled by the voltage tripler to form the anode voltage (EHT) for the picture tube.

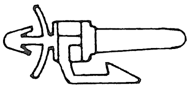
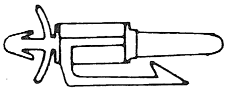
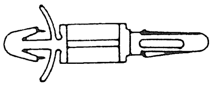
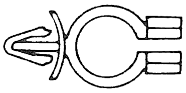
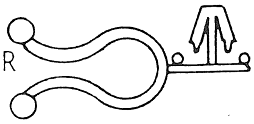
The horizontal deflection circuit is modulated by the east-west modulator. This circuit offers the possibility of taking correction as well as the setting of the picture width and the degree of pincushion distortion.

The integrated circuit TDA 1170 contains the complete vertical deflection circuit : oscillator, rampgenerator and output amplifier.

At least we can find the power supply on the main board. It is a mains isolated type, built around transformer T1 (flyback converter type). The mains voltage enters via an RFI filter, becomes rectified and smoothed.
Via the switching transistor Q1, energy becomes stored in transformer T1 and when Q1 is blocked, the energy stored in transformer T1 is taken on the secondary side. At the secondary side all necessary voltages are present.
IC1 TDA 4600 manages the good working of the power supply part.
The picture tube is demagnetisated by the degaussing coil, directed by the degaussing circuit.

The RGB amplifier unit (mounted at one of the flaps) outputs amplified R, G and B pulses. This part contains adjustments for gain and cut-off. Also in this part the blankingpulses are amplified and used to restore the black level during the horizontal blanking time (backporch).

PARTS LIST CF33

REF.NR.	DESCRIPTION		NOTES
C13.....	PICTURE TUBE (SEE CROSS REFERENCE LIST)		
C312000	SPRING AQUADAG 7X50/0.60		
C313335	SPACER 12.7		FOR MOUNTING MAINBOARD ON BASE PLATE
C313336	SPACER 19		FOR MOUNTING RGB AMPLIFIER C660020 ON RGB FIXATION PLATE C6000291
C313338	SPACER 12.7		FOR MOUNTING MAINBOARD ON BOTTOM-PLATE
C348070	CABLE CLIP D 9.53		FOR FIXATION OF DEGAUSSING COIL ON PICTURE TUBE FIXATION LEFT AND RIGHT
C348071	CABLE TIE DRILLER		FOR FIXATION OF EHT CABLE AT PICTURE TUBE FIXATION RIGHT
C348901	FLAT CABLE SHIELDED CF33		INTERCONNECTION BETWEEN INPUT AND RGB AMPLIFIER C660020
C348902	FLAT CABLE POWER CF33		INTERCONNECTION BETWEEN MAINBOARD AND RGB AMPLIFIER
C313614	CONNECTORHOUSE DEFLECTION		
C600015	INPUT PLUG PLATE CF33		
C600027	PICTURE TUBE FIXATION LEFT CF33		
C600028	PICTURE TUBE FIXATION RIGHT CF33		
C6000291	RGB AMPLIFIER FIXATION PLATE CF33		
C600038	BOTTOM-PLATE CF33		
C660020	UNIT RGB AMPLIFIER CF33		
C660023	UNIT TTL INPUT CF33		WHEN CF33 WITH TTL INPUT
or C6600241 + C660072 + C660074 + C3490225			WHEN CF33 WITH ANALOG RGBS INP.
C6600241	UNIT ANALOG INPUT CF33		
C660072	UNIT PLUG INPUT CF33		
C660074	UNIT RGB FLOATING IN CF33		
C3490225	CORD CPL - C660072 CF33		INTERCONNECTION BETWEEN C660072 AND C660074

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PARTSLIST CF33 - continuation

REF.NR.	DESCRIPTION	NOTES
C66.....	UNIT MAINBOARD CF33	SEE CROSS REFERENCE LIST
C660030	UNIT CRT SOCKET CF33	WITH OTHER PICTURE TUBES THAN LISTED IN THE CROSS REFERENCE LIST, ANOTHER CRT SOCKET UNIT CAN BE MOUNTED IN YOUR CF33 (C660022 OR C660031). PLEASE CHECK BEFORE ORDERING SPARE PARTS.
C660057	UNIT AQUADAG CF33	
C660105	UNIT MAINS CONNECTOR	MAINS PLUG & INTERCONNECTION TO MAINBOARD
C670005	COIL DEGAUSSING 220V	
or C670006	COIL DEGAUSSING 120V	COIL DEGAUSSING DEPENDING ON MAINS VOLTAGE (SEE CROSS REFERENCE LIST)

CF33 CROSS REFERENCE LIST (FOR COMMON PARTS OF ALL CF33 VERSIONS, SEE PARTS LIST)*

ITEM	NAME/RESOLUTION/ INPUT/MAINS	PICTURE TUBE *		MAIN BOARD **	DEGAUSS. COIL	INPUT UNIT ***
		NUMBER	DESCRIPTION			
C9340100	CF33 HR TTL 220V	C1310901	370JYB22TC04	C660033 (C660027)	C670005	C660023
C9340110	CF33 HR TTL 120V	C1310901	370JYB22TC04	C660032 (C660026)	C670006	C660023
C9340120	CF33 HR A 220V	C1310901	370JYB22TC04	C660033	C670005	C6600241 + C660072 + C660074
C9340130	CF33 HR A 120V	C1310901	370JYB22TC04	C660032	C670006	C6600241 + C660072 + C660074
C9340140	CF33 MR TTL 220V	C131102	370LJB22TC04	C6600331	C670005	C6600241 + C660072 + C660074
C9340150	CF33 MR TTL 120V	C131102	370LJB22TC04	C6600321	C670006	C6600241 + C660072 + C660074
C9340160	CF33 HRLP TTL 220V	C131105	370JYB22TC04LP	C660033 (C660027)	C670005	C660023
C9340170	CF33 HRLP TTL 120V	C131105	370JYB22TC04LP	C660032 (C660026)	C670006	C660023
C9340180	CF33 HRLP A 220V	C131105	370JYB22TC04LP	C660033	C670005	C6600241 + C660072 + C660074
C9340190	CF33 HRLP A 120V	C131105	370JYB22TC04LP	C660032	C670006	C6600241 + C660072 + C660074
C9340210	CF33 MR TTL 220V	C131102	370LJB22TC04	C6600331(C6600271)	C670005	C660023
C9340220	CF33 MR TTL 120V	C131102	370LJB22TC04	C6600321(C6600261)	C670006	C660023

* the CF33 can be equipped with another picture tube than the one listed above; please check the number of the picture tube and the CRT socket unit (normally C660030) of your CF33 before ordering spare parts

** for earlier models, number between brackets

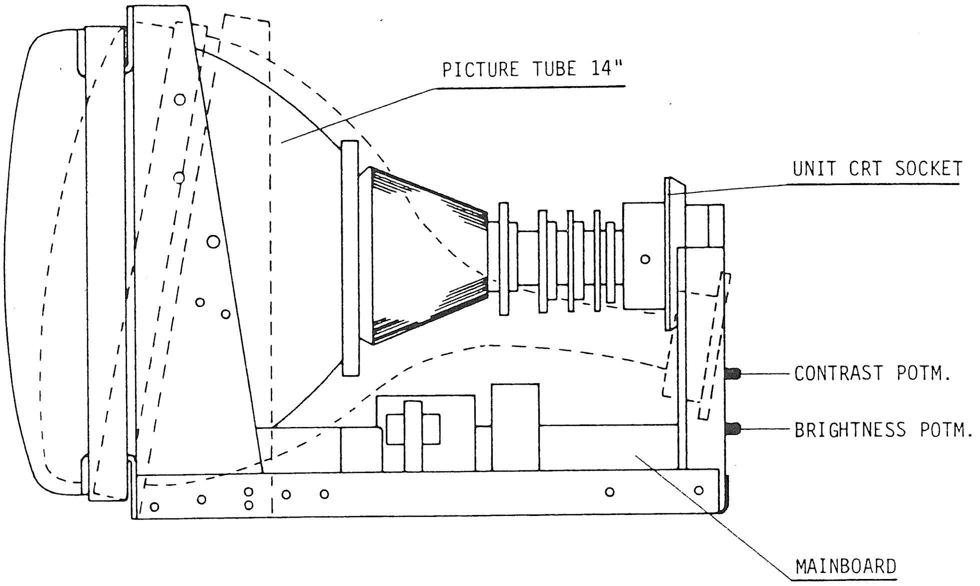
*** order number for ANALOG RGBS INPUT: C6600241 + C660072 + C660074 + C3490225

FUSE LIST CF 33

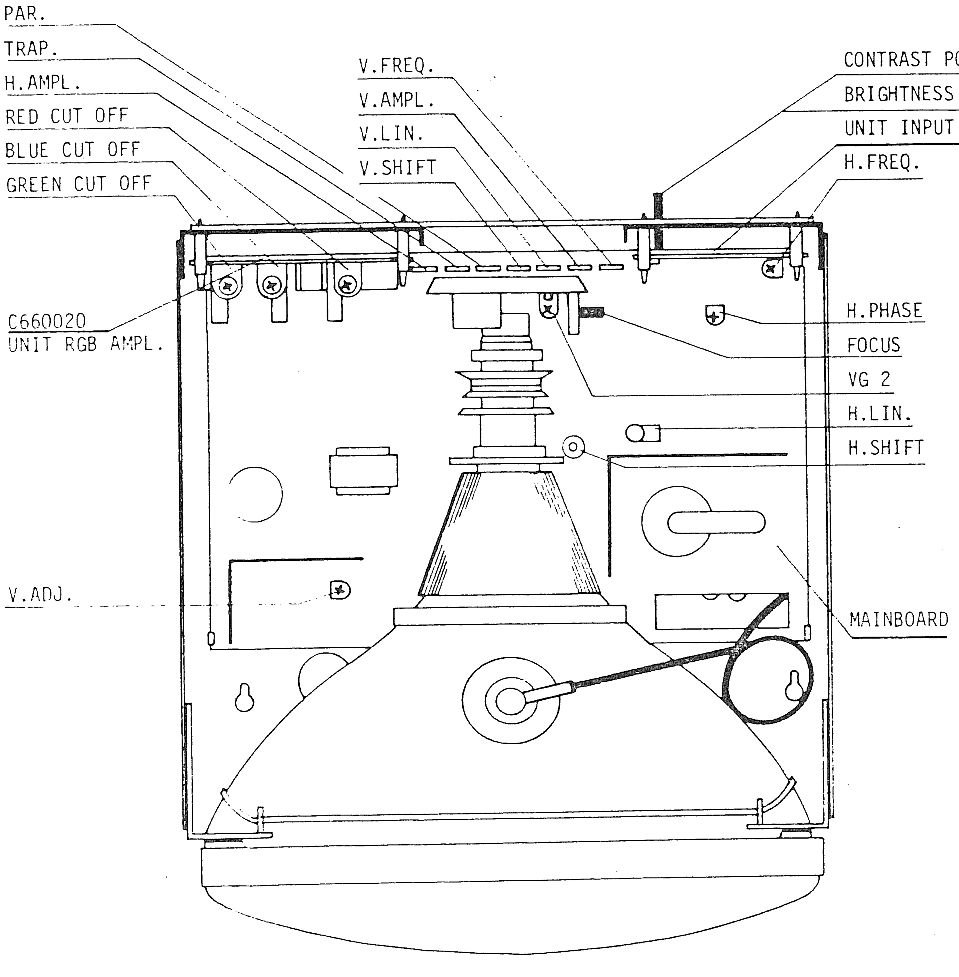
UNIT	DESCRIPTION			POSITION	BC REF. N°
TTL INPUT UNIT C660023	RRCFFUL	2E2	J 0.25	SR 41	C1011049
RGB Ampl. C660020	RRCF	100E	J 0.50	SR 5	C101224
	RRCFF	22E	J 0.50	SR 7	C1012168
	RRCFFUL	220E	J 0.25	SR 15	C1011289
	RRCFFUL	220E	J 0.25	SR 24	C1011289
	RRCFFUL	220E	J 0.25	SR 33	C1011289
Main chassis (120V TTL) C660026	FUSE 2A SLOW			F1	C314138
	FUSE 2A SLOW			F2	C314138
	FUSE 2A FAST			F3	C314139
	RRCFF	1E5	J 0.25	SR 16 B	C1011026
	RRCFFUL	22E	J 0.25	SR 19	C1011169
	RRCFFUL	47E	J 0.25	SR 36	C1012209
	RRCFFUL	1K5	J 0.25	SR 42	C1012389
	RRCF	E47	J 0.25	SR 19 B	C1012947
	RRCFFUL	2E2	J 0.25	SR 63	C1011049
Main chassis (220V TTL) C660027	FUSE 2A SLOW			F1	C314116
	FUSE 2A SLOW			F2	C314116
	FUSE 1.25A FAST			F3	C314102
	RRCFF	1E5	J 0.35	SR 16 B	C1011026
	RRCFFUL	22E	J 0.25	SR 19	C1011169
	RRCFFUL	47E	J 0.50	SR 36	C1012209
	RRCFFUL	1K5	J 0.50	SR 42	C1012389
	RRCF	E47	J 0.50	SR 45 B	C1012947
	RRCFFUL	2E2	J 0.25	SR 63	C1011049

Board location CF33

Side view


PICTURE TUBE 14"
UNIT CRT SOCKET
CONTRAST POTM.
BRIGHTNESS POTM.
MAINBOARD

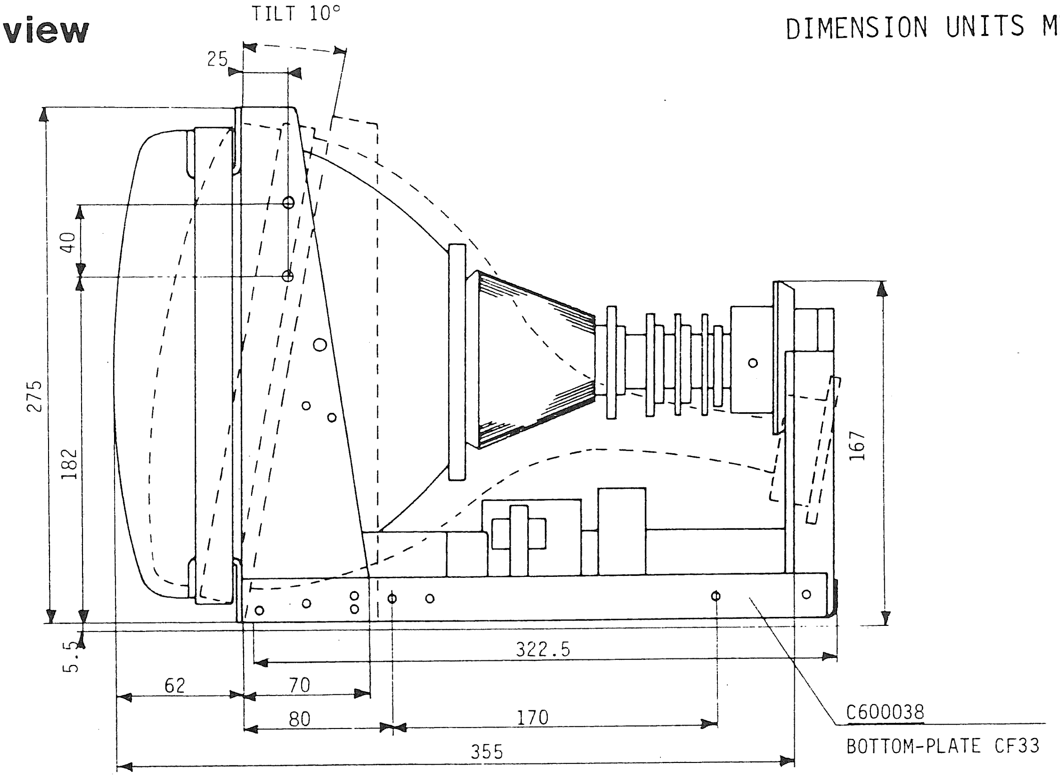
Top view


PAR.
TRAP.
H.AMPL.
RED CUT OFF
BLUE CUT OFF
GREEN CUT OFF
V.FREQ.
V.AMPL.
V.LIN.
V.SHIFT
CONTRAST POTM.
BRIGHTNESS POTM.
UNIT INPUT CF33
H.FREQ.
C660020
UNIT RGB AMPL.
H.PHASE
FOCUS
VG 2
H.LIN.
H.SHIFT
V.ADJ.
MAINBOARD

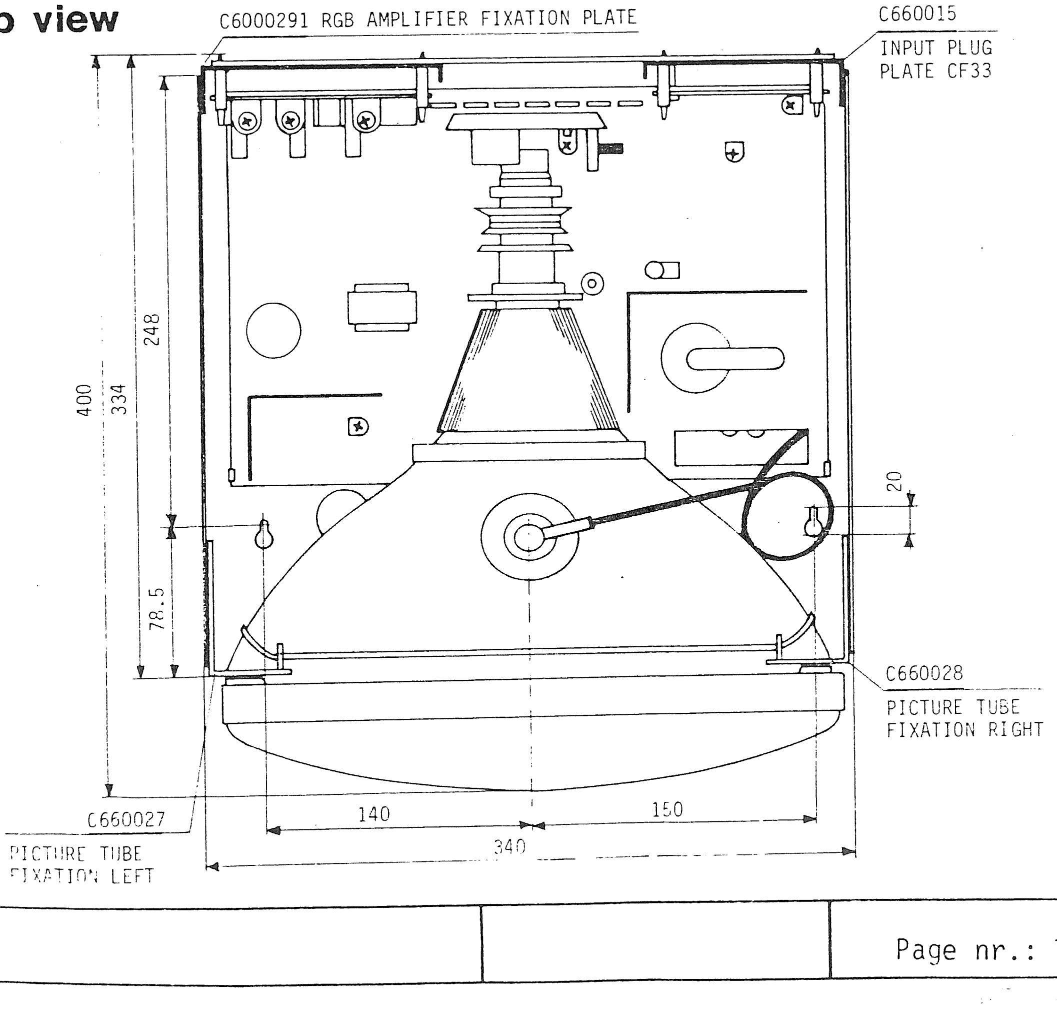
Dimensions CF33
Position of mechanical parts

Side view

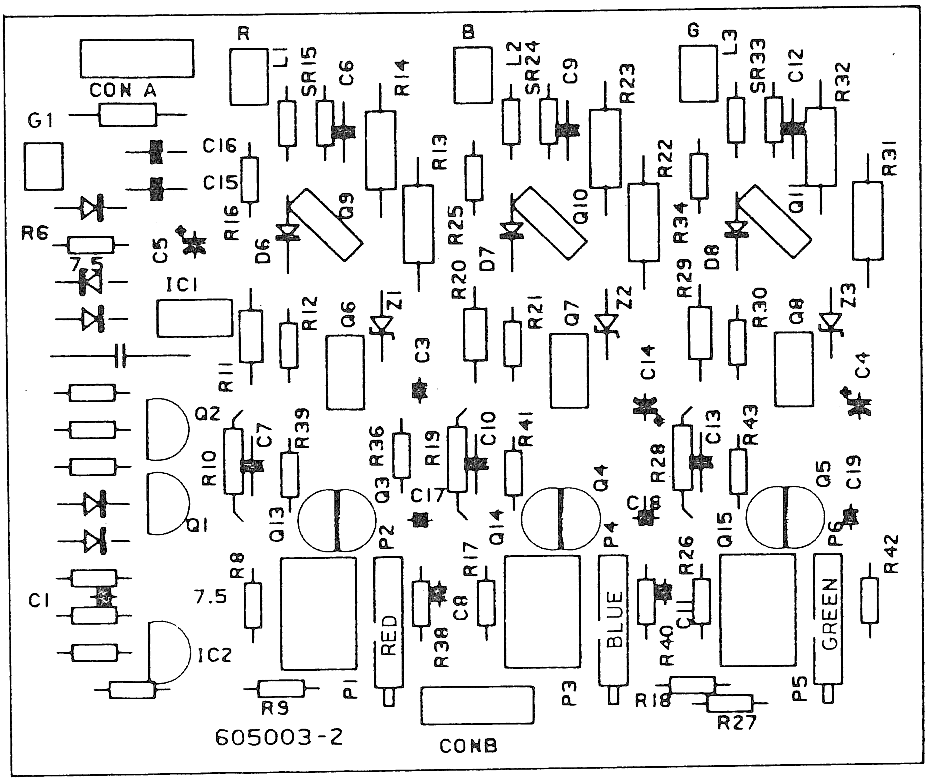
DIMENSION UNITS MM

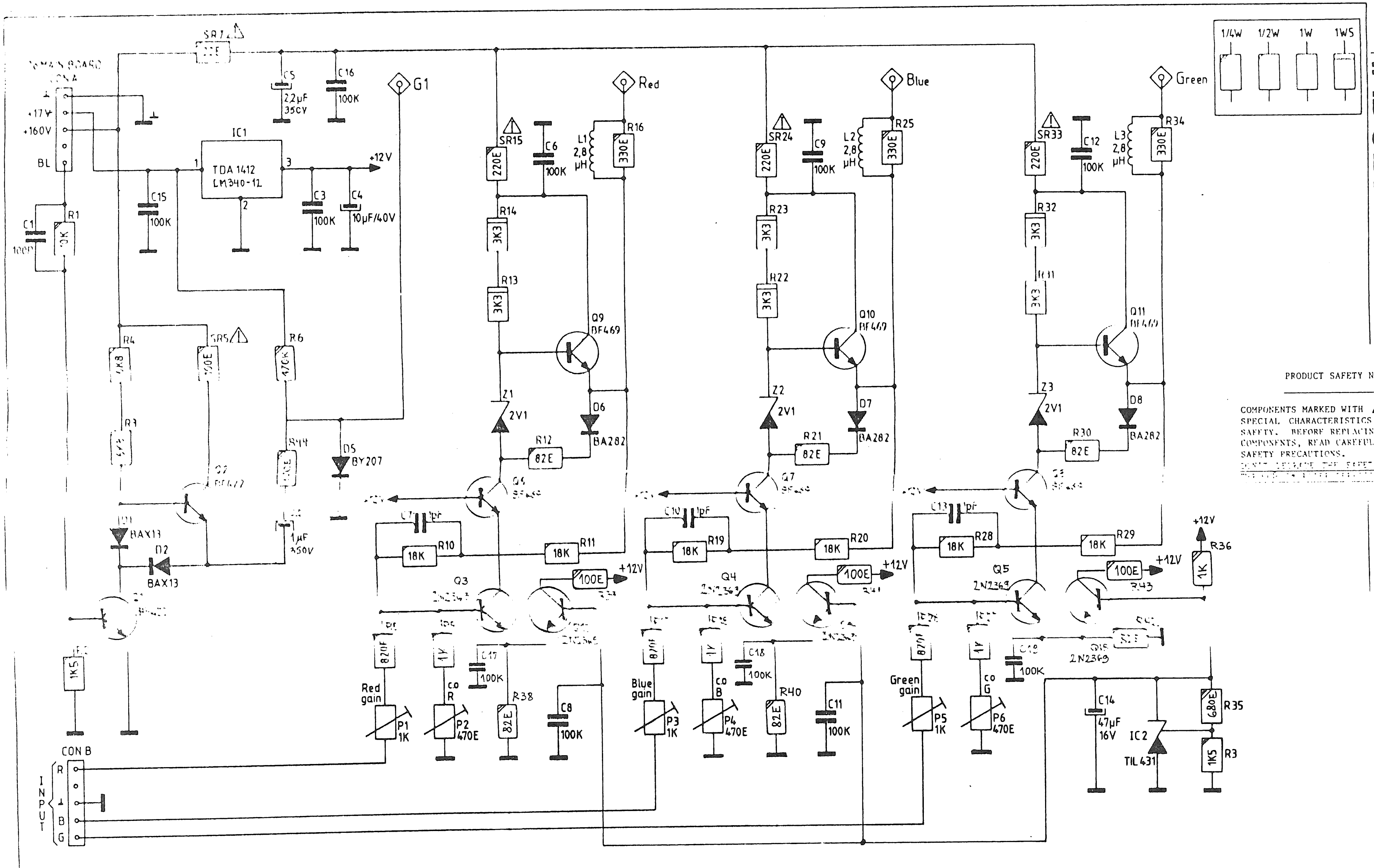

TILT 10°
25
40
275
182
5.5
167
322.5
62
70
80
170
355
C600038
BOTTOM-PLATE CF33

Top view


C6000291 RGB AMPLIFIER FIXATION PLATE
C660015
INPUT PLUG PLATE CF33
400
334
248
78.5
20
C660028
PICTURE TUBE FIXATION RIGHT
C660027
PICTURE TUBE FIXATION LEFT
140
150
340

RGB Amplifier C660020


R
B
G
CON A
L1
SR15
C6
R14
L2
SR24
C9
R23
L3
SR33
C12
R32
G1
C16
C15
R16
R13
R22
R31
Q9
Q10
Q11
R6
C5
D6
R25
D7
R34
D8
7.5
IC1
R20
R29
R12
Q6
Z1
R21
Q7
Z2
R30
Q8
Z3
R11
C3
C14
C4
Q2
C7
R39
R36
R19
C10
R41
R28
C13
R43
R10
Q3
C17
Q4
C18
Q5
C19
Q1
Q13
P2
Q14
P4
Q15
P6
R8
R17
R26
R42
7.5
C1
C8
C11
RED
BLUE
GREEN
R38
R40
IC2
P1
P3
R18
P5
R9
R27
605003-2
CONB



1/4W
1/2W
1W
1WS
To MAIN BOARD CON A
+17V
+160V
BL
C1 100P
R1 10K
SR7
C5 2,2µF 35CV
C16 100K
G1
IC1
TDA 1412
LM340-12
+12V
C15 100K
C3 100K
C4 10µF/40V
R4 1K8
R3
SR5 100E
R6 470K
R44
D5 BY207
Q2 BF422
D1 BAX13
D2 BAX13
1µF 350V
1K5
CON B
INPUT
R
B
G
Red
Blue
Green
SR15 220E
SR24 220E
SR33 220E
C6 100K
C9 100K
C12 100K
L1 2,8 µH
L2 2,8 µH
L3 2,8 µH
R16 330E
R25 330E
R34 330E
R14 3K3
R13 3K3
R23 3K3
R22 3K3
R32 3K3
R31 3K3
Q9 BF469
Q10 BF469
Q11 BF469
Z1 2V1
Z2 2V1
Z3 2V1
D6 BA282
D7 BA282
D8 BA282
R12 82E
R21 82E
R30 82E
Q6
Q7
Q8
C7 1pF
C10 1pF
C13 1pF
R10 18K
R11 18K
R19 18K
R20 18K
R28 18K
R29 18K
Q3 2N2369
Q4 2N2369
Q5 2N2369
100E
+12V
R43
R36 1K
820E
1K
C17 100K
C18 100K
C19 100K
Red gain
Blue gain
Green gain
co R
co B
co G
P1 1K
P2 470E
P3 1K
P4 470E
P5 1K
P6 470E
R38 82E
R40 82E
C8 100K
C11 100K
Q15 2N2369
C14 47µF 16V
IC2 TIL 431
R35 680E
R3 1K5

C660020 RGB AMPLIFIER

R 1,2, 3,4 5, 7, 6, P1,8, 10, P2,9, 38,13,14,15, 12, 11, 39, 16, P3,17, 19, P4,18, 22,23,24,40,21, 20, 41, 25, P5,26, 28, P6,27, 31,32,33, 30, 29, 43,43, 34, 35,36,

C 1, 15, 2, 5, 3, 16,4, 7, 17, 6, 8, 10, 18, 9, 11, 13, 19, 12, 14,

Q 2, 3, 6, 13, 9, 4, 7, 14, 10, 5, 8, 15, 11,

MODIFICATIONS RESERVED

22·01-85

BARCO INDUSTRIES

PRODUCT SAFETY NOTICE

COMPONENTS MARKED WITH ⚠ OR * HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS, READ CAREFULLY THE SERVICE SAFETY PRECAUTIONS.
[illegible]

UN. RGB 15M CF33

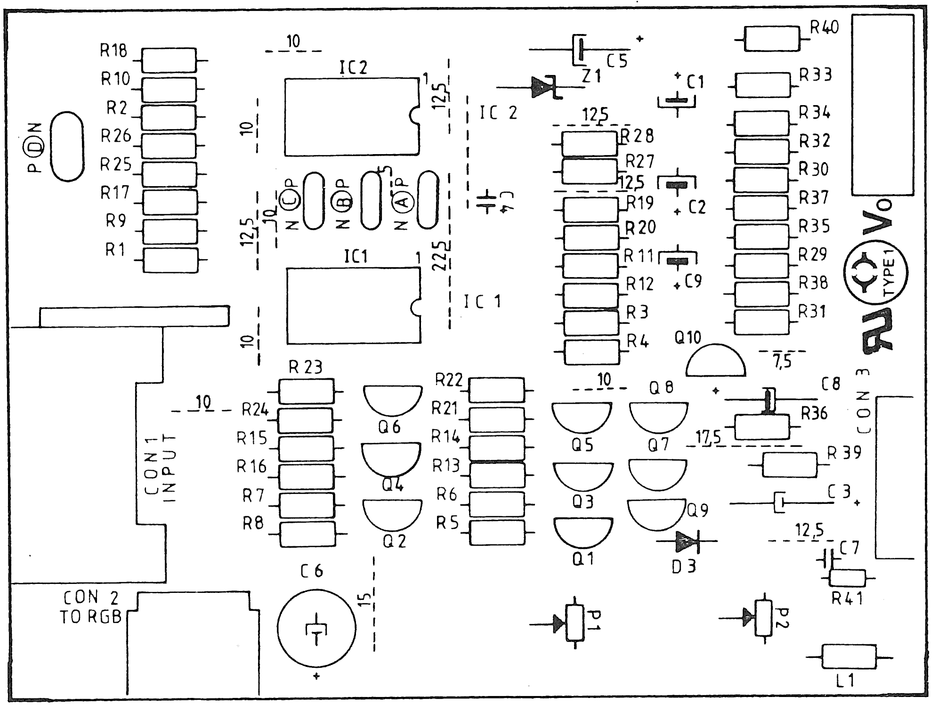
PART NR.: C660020

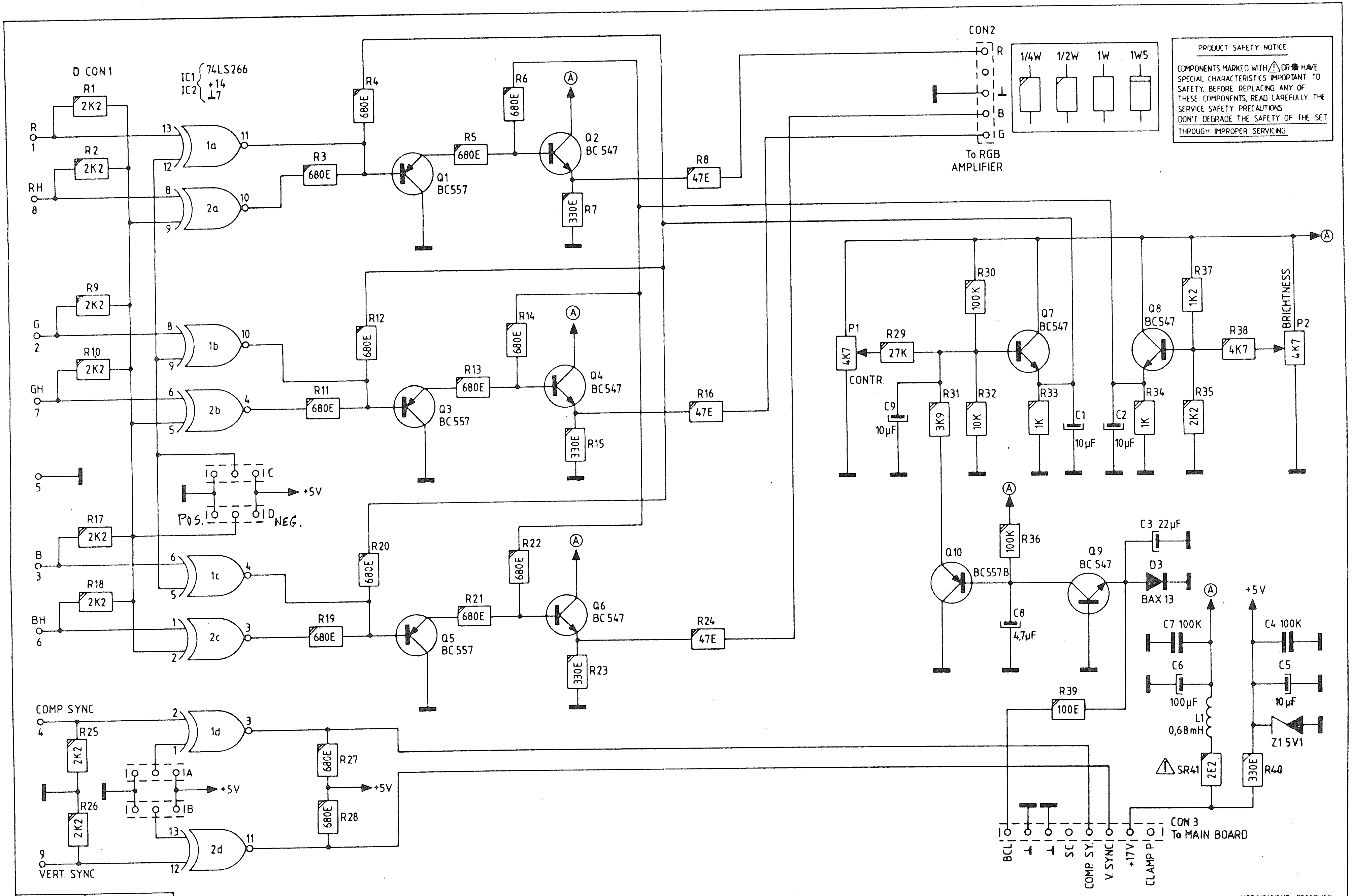
REF. NR.	POSITION	DESCRIPTION
V112242	C1	CNPO MI 100P G5 63
C111256	C2	CELAX 1M T 350
C112774	C3	CCE MI 100K U5 63
V111494	C4	CELPR 10M Z 63
C111261	C5	CELAX 2M2 T 350
C114132	C6	CPOMEFF 100K K 250
C1120711	C7	CN750PE 1P C 400
C112774	C8	CCE MI 100K U5 63
C114132	C9	CPOMEFF 100K K 250
C1120711	C10	CN750PE 1P C 400
C112774	C11	CCE MI 100K U5 63
C114132	C12	CPOMEFF 100K K 250
C1120711	C13	CN750PE 1P C 400
C111465	C14	CELPR 47M Z 16
C112774	C15	CCE MI 100K U5 63
C114132	C16	CPOMEFF 100K K 250
C112774	C17	CCE MI 100K U5 63
C112774	C18	CCE MI 100K U5 63
C112774	C19	CCE MI 100K U5 63
C131621	D1	SMCDIO BAX 13
C131621	D2	SMCDIO BAX 13
C101124	D4	RRCF 100E J 0.25
C131910	D5	SMCDIOREC BY 207
V131613	D6	SMCDIO BA 282
V131613	D7	SMCDIO BA 282
V131613	D8	SMCDIO BA 282
C134002	IC1	SMCICLVOL LM 340T12
V134018	IC2	SMCICLVOL TL 431CLP
C670012	L1	SPO RGB 2.48 uH
C670012	L2	SPO RGB 2.48 uH
C670012	L3	SPO RGB 2.48 uH
C1061041	P1	RECP10H 1K M 0,10
C107509	P2	MUP 500E K 0.75
C1061041	P5	RECP10H 1K M 0,10
C107509	P6	MUP 500E K 0,75
C605003	PC	PC RGB CF 33 02
V132516	Q1	SMCTRA BF 422
V132516	Q2	SMCTRA BF 422
C131491	Q3	SMCTRA 2N 2369
C131491	Q4	SMCTRA 2N 2369
C131491	Q5	SMCTRA 2N 2369
C1325145	Q6	SMCTRA BF 469
C1325145	Q7	SMCTRA BF 469
C1325145	Q8	SMCTRA BF 469
C1325145	Q9	SMCTRA BF 469
C1325145	Q10	SMCTRA BF 469
C1325145	Q11	SMCTRA BF 469
C1314311	Q12	SMCTRA BC 327
C131491	Q13	SMCTRA 2N 2369
C131491	Q14	SMCTRA 2N 2369
C131491	Q15	SMCTRA 2N 2369

REF. NR.	POSITION	DESCRIPTION
C101148	R1	RRCF 10K J 0,25
C101136	R2	RRCF 1K J 0,25
C101246	R3	RRCF 6K8 J 0,50
C101246	R4	RRCF 6K8 J 0,50
C1011249	R5	RRCFFUL 100E J 0,25
C101168	R6	RRCF 470K J 0,25
C1012169	R7	RRCFFUL 22E J 0,50
C101135	R8	RRCF 820E J 0,25
C101136	R9	RRCF 1K J 0,25
C101251	R10	RRCF 18K J 0,50
C101251	R11	RRCF 18K J 0,50
C101123	R12	RRCF 82E J 0,25
C103242	R13	RRMO 3K3 J 1,50
C103242	R14	RRMO 3K3 J 1,50
C1011289	R15	RRCFFUL 220E J 0,25
C101131	R16	RRCF 390E J 0,25
C101135	R17	RRCF 820E J 0,25
C101136	R18	RRCF 1K J 0,25
C101251	R19	RRCF 18K J 0,50
C101251	R20	RRCF 18K J 0,50
C101123	R21	RRCF 82E J 0,25
C103242	R22	RRMO 3K3 J 1,50
C103242	R23	RRMO 3K3 J 1,50
C1011289	R24	RRCFFUL 220E J 0,25
C101136	R25	RRCF 390E J 0,25
C101135	R26	RRCF 820E J 0,25
C101136	R27	RRCF 1K J 0,25
C101251	R28	RRCF 18K J 0,50
C101251	R29	RRCF 18K J 0,50
C101123	R30	RRCF 82E J 0,25
C103242	R31	RRMO 3K3 J 1,50
C103242	R32	RRMO 3K3 J 1,50
C1011289	R33	RRCFFUL 220E J 0,25
C101131	R34	RRCF 390E J 0,25
C101134	R35	RRCF 680E J 0,25
C101134	R36	RRCF 1K J 0,25
C101136	R37	RRCF 1K5 J 0,25
C101123	R38	RRCF 82E J 0,25
C101124	R39	RRCF 100E J 0,25
C101123	R40	RRCF 82E J 0,25
C101124	R41	RRCF 100E J 0,25
C101123	R42	RRCF 82E J 0,25
C101124	R43	RRCF 100E J 0,25
C131733	Z1	SMCDIOZEN 0.40 2V1
C131733	Z2	SMCDIOZEN 0.40 2V1
C131733	Z3	SMCDIOZEN 0.40 2V1
V[illegible]443	3X	TRANSISTORCLIPS
C133052	3X	SMCTRA COOLER TO 220
C[illegible]13563	4X	CON FOW TE SNAP P1
[illegible]137050	2X	CON MOB TE MTIC P5

BARCO TTL input unit

C660023


R18
R10
R2
R26
R25
R17
R9
R1
P D N
10
IC2
1
12,5
IC 2
10
12,5
10
N C P
N B P
5
N A P
C4
IC1
1
22,5
IC 1
10
Z1
C5
C1
12,5
R28
R27
12,5
R19
C2
R20
R11
C9
R12
R3
R4
Q10
R40
R33
R34
R32
R30
R37
R35
R29
R38
R31
TYPE 1
Vo
7,5
C8
R36
CON 3
R 23
10
R24
R15
R16
R7
R8
CON1 INPUT
Q6
Q4
Q2
R22
R21
R14
R13
R6
R5
10
Q8
Q5
Q7
Q3
Q9
Q1
D3
17,5
R 39
C 3
12,5
C7
R41
C6
15
CON 2 TO RGB
P1
P2
L1


D CON1
R 1
RH 8
G 2
GH 7
5
B 3
BH 6
COMP SYNC 4
VERT. SYNC 9
R1 2K2
R2 2K2
R9 2K2
R10 2K2
R17 2K2
R18 2K2
R25 2K2
R26 2K2
IC1 IC2 74LS266 +14 ⊥7
1a
2a
1b
2b
1c
2c
1d
2d
13
12
11
8
9
10
6
5
4
1
2
3
IA
IB
IC
ID
+5V
POS.
NEG.
R3 680E
R4 680E
R5 680E
R6 680E
R7 330E
R8 47E
R11 680E
R12 680E
R13 680E
R14 680E
R15 330E
R16 47E
R19 680E
R20 680E
R21 680E
R22 680E
R23 330E
R24 47E
R27 680E
R28 680E
Q1 BC557
Q2 BC 547
Q3 BC557
Q4 BC547
Q5 BC557
Q6 BC 547
Ⓐ
CON2
R
⊥
B
G
To RGB AMPLIFIER
1/4W
1/2W
1W
1W5
P1 4K7
CONTR
R29 27K
R30 100K
R31 3K9
R32 10K
R33 1K
R34 1K
R35 2K2
R36 100K
R37 1K2
R38 4K7
R39 100E
R40 330E
SR41 2E2
P2 4K7
BRIGHTNESS
C9 10µF
C1 10µF
C2 10µF
C3 22µF
C8 4,7µF
C7 100K
C6 100µF
C4 100K
C5 10µF
L1 0,68mH
Q7 BC547
Q8 BC547
Q9 BC 547
Q10 BC557B
D3 BAX 13
Z1 5V1
+5V
CON 3 To MAIN BOARD
BCL
⊣
⊣
SC
COMP. SY.
V. SYNC
+17V
CLAMP P

PRODUCT SAFETY NOTICE

COMPONENTS MARKED WITH ⚠ OR ✱ HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS, READ CAREFULLY THE SERVICE SAFETY PRECAUTIONS.
DON'T DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING.

MODIFICATIONS RESERVED

C660023 TTL INPUT

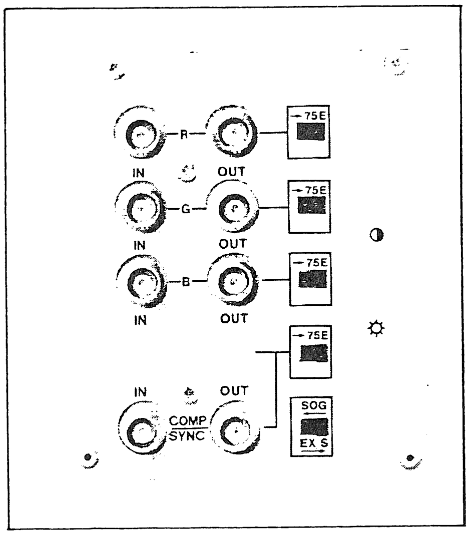
R	26,25,12,9,10,17,18,	3,11,19,27,28,	4,12,20,		5,13,21,	6,14,22,	7,15,23,	8,16,24,	P1,	29,	31,	30,32,	36,	33,	39,			34,	37,35,41,	38,	40,	P2,
C													8,		1,		2,	3,	6,7,		4,	5,
Q				1, 3, 5,			2, 4, 6,				10,			7,		9,		8,				

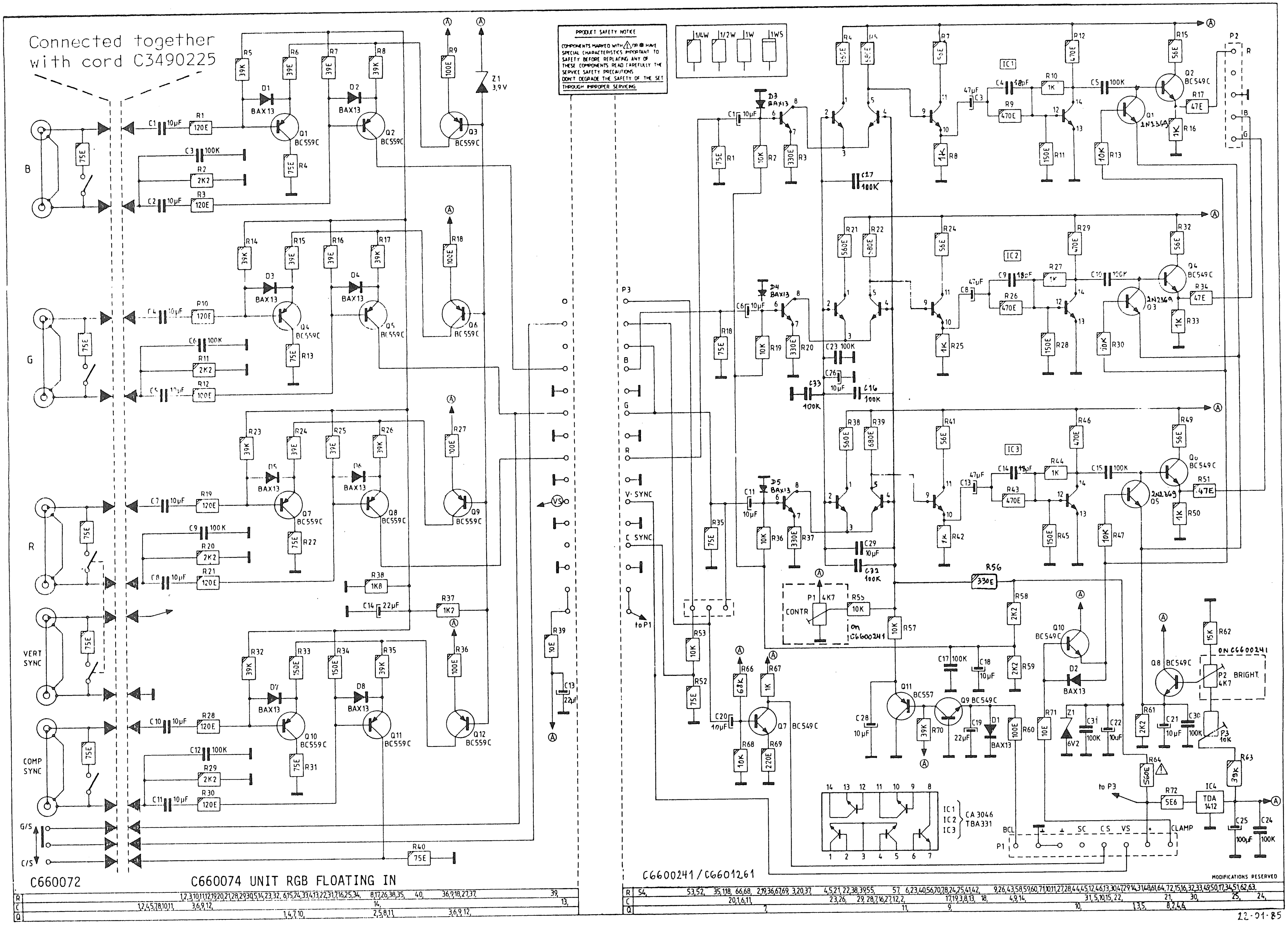
26.05.82

UN. TTL INPUT CF33 / PART NR: C660023

REF.NR.	POSITION	DESCRIPTION
C111494	C1	CELPR 10M Z 63
C111494	C2	CELPR 10M Z 63
C111157	C3	CELAX 22M Z 25
C112774	C4	CCE MI100K U5 63
C111156	C5	CELAX 10M Z 25
C111477	C6	CELPR 100M Z 25
C112774	C7	CCE MI100K U5 63
C111184	C8	CELAX 4M7 Z 40
C111494	C9	CELPR 10M Z 63
C313516	CON1	CONFOBSE 90 DE- 9S
C313584	CON2	CONMOBTE 90 P5
C313608	CON3	CONMINIMATCH F2,5-8
C131621	D3	SMCDIO BAX 13
C137487	IC1	SMCICD 74LS266
C137487	IC2	SMCICD 74LS266
C306170	L1	CHOKE 680UH
C107131	P1	RPCAM 4K7 K 0,25
C107131	P2	RPCAM 4K7 K 0,25
C605002	PC	PC -C660023 01
C131413	Q1	SMCTRA BC 557
C131407	Q2	SMCTRA BC 547
C131413	Q3	SMCTRA BC 557
C131407	Q4	SMCTRA BC 547
C131413	Q5	SMCTRA BC 557
C131407	Q6	SMCTRA BC 547
C131407	Q7	SMCTRA BC 547
C131407	Q8	SMCTRA BC 547
C131407	Q9	SMCTRA BC 547
C1314131	Q10	SMCTRA BC 557B
C101140	R1	RRCF 2K2 J 0,25
C101140	R2	RRCF 2K2 J 0,25
C101134	R3	RRCF 680E J 0,25
C101134	R4	RRCF 680E J 0,25
C101134	R5	RRCF 680E J 0,25
C101134	R6	RRCF 680E J 0,25
C101130	R7	RRCF 330E J 0,25
C101120	R8	RRCF 47E J 0.25
C10	R9	RRCF 2K2 J
C101140	R10	RRCF 2K2 J 0,25
C101134	R11	RRCF 680E J 0,25
C101134	R12	RRCF 680E J 0,25
C101134	R13	RRCF 680E J 0,25
C101134	R14	RRCF 680E J 0,25
C101130	R15	RRCF 330E J 0,25
C101120	R16	RRCF 47E J 0,25
C101140	R17	RRCF 2K2 J 0,25
C101140	R18	RRCF 2K2 J 0,25
C101134	R19	RRCF 680E J 0,25
C101134	R20	RRCF 680E J 0,25
C101134	R21	RRCF 680E J 0,25
C101134	R22	RRCF 680E J 0,25
C101130	R23	RRCF 330E J 0,25
C101120	R24	RRCF 47E J 0,25
C101140	R25	RRCF 2K2 J 0,25
C101140	R26	RRCF 2K2 J 0,25
C101134	R27	RRCF 680E J 0,25
C101134	R28	RRCF 680E J 0,25
C101153	R29	RRCF 27K J 0,25
C101160	R30	RRCF 100K J 0,25
C101143	R31	RRCF 3K9 J 0,25
C101148	R32	RRCF 10K J 0,25
C101136	R33	RRCF 1K J 0,25
C101136	R34	RRCF 1K J 0,25
C101140	R35	RRCF 2K2 J 0,25
C101160	R36	RRCF 100K J 0,25
C101137	R37	RRCF 1K2 J 0,25
C101144	R38	RRCF 4K7 J 0,25
C101124	R39	RRCF 100E J 0,25
C101230	R40	RRCF 330E J 0,50
C1011049	R41	RRCFFUL 2E2 J 0,25
C131716	Z1	SMCDIOZEN 0,5 5V1
C313276		CONMOBTE 2,5 P10
C313392		CON F JUMP 2,54 P 2

Floating analog input
C660024 C660072 C660074 C3490225


R
IN
OUT
75E
G
IN
OUT
75E
B
IN
OUT
75E
75E
IN
OUT
COMP
SYNC
SOG
EX S



C660074 UNIT RGB FLOATING IN

C660072

C6600241/C6601261

PRODUCT SAFETY NOTICE

COMPONENTS MARKED WITH ⚠ OR ■ HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY BEFORE REPLACING ANY OF THESE COMPONENTS READ CAREFULLY THE SERVICE SAFETY PRECAUTIONS

DON'T DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING

Connected together with cord C3490225

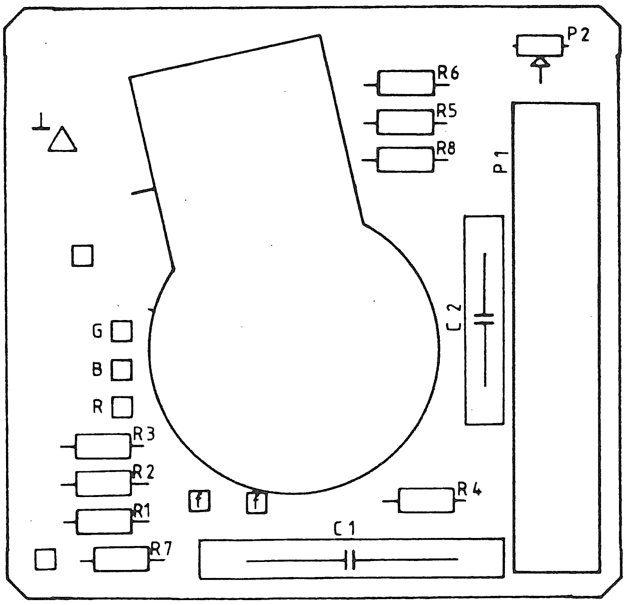
MODIFICATIONS RESERVED

22-01-85

1/4W
1/2W
1W
1W5
B
G
R
VERT SYNC
COMP SYNC
G/S
C/S
75E
C1 10µF
R1 120E
C2 10µF
R3 120E
C3 100K
R2 2K2
R5 39K
R6 39E
R7 39E
R8 39K
D1 BAX13
D2 BAX13
Q1 BC559C
Q2 BC559C
Q3 BC559C
R4 75E
R9 100E
Z1 3,9V
Q4 BC559C
Q5 BC559C
Q6 BC559C
Q7 BC559C
Q8 BC559C
Q9 BC559C
Q10 BC559C
Q11 BC559C
Q12 BC559C
D3 BAX13
D4 BAX13
D5 BAX13
D6 BAX13
D7 BAX13
D8 BAX13
R38 1K8
R37 1K2
C14 22µF
R40 75E
R39 10E
C13 22µF
VS
P3
V-SYNC
C SYNC
to P1
IC1
IC2
IC3
C27 100K
C23 100K
C26 10µF
C33 100K
C16 100K
C29 10µF
C32 100K
R56 330E
P1 4K7 CONTR
R55 10K
on C6600241
R57 10K
Q11 BC557
Q9 BC549C
Q10 BC549C
Q7 BC549C
Q8 BC549C
Q2 BC549C
Q4 BC549C
Q6 BC549C
Q1 2N2369
Q3 2N2369
Q5 2N2369
R62 15K
ON C6600241
P2 BRIGHT 4K7
P3 10K
R63 39K
IC4 TDA 1412
C25 100µF
C24 100K
R72 5E6
R64 560E
to P3
Z1 6V2
IC1 IC2 IC3 CA 3046 TBA331
P1
BCL
SC
CS
VS
CLAMP
P2
R
B
G

R 1,2,3,10,11,12,19,20,21,28,29,30,5,14,23,32, 6,15,24,33,4,13,22,31,7,16,25,34, 8,17,26,38,35, 40, 36,9,18,27,37, 39,
C 1,2,4,5,7,8,10,11, 3,6,9,12, 14, 13,
Q 1,4,7,10, 2,5,8,11, 3,6,9,12,
R 54, 53,52, 35,1,18, 66,68, 2,19,36,67,69, 3,20,37, 4,5,21,22,38,39,55, 57, 6,23,40,56,70,7,8,24,25,41,42, 9,26,43,58,59,60,71,10,11,27,28,44,45,12,46,13,30,47,29,14,31,48,61,64,72,15,16,32,33,49,50,17,34,51,62,63.
C 20,1,6,11, 23,26, 29, 28,7,16,27,12,2, 17,19,3,8,13, 18, 4,9,14, 31,5,10,15,22, 21, 30, 25, 24,
Q 7, 11, 9, 10, 1,3,5, 8,2,4,6,

CRT socket unit HR N C660022



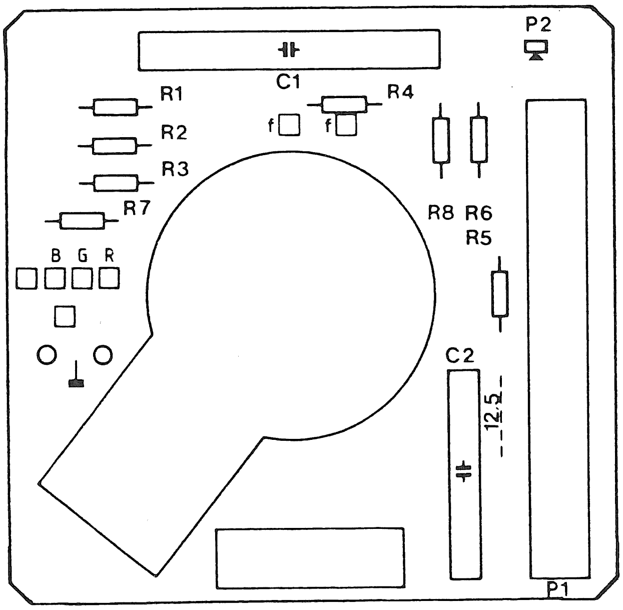
P2
R6
R5
R8
P1
C2
G
B
R
R3
R2
R1
R7
R4
C1
f
f

UN.CRTSOC14 H.R.   N

PART NR : C660022

REF.NR.	POSITION	DESCRIPTION
C114874	C1	CPO AX100K M 630
C114602	C2	S HV 47K M 1000
C107607	P1	RPFOCUS 24M K 3,80
C1062151	P2	RTCAPPV 2M2 M 0,20
C605006	PC	PC -C660002 01
C101228	R1	RRCF 220E J 0,50
C101228	R2	RRCF 220E J 0,50
C101228	R3	RRCF 220E J 0,50
C101262	R4	RRCF 150K J 0,50
C104656	R6	RRHV 1M2 J 0,50
C101238	R7	RRCF 1K5 J 0,50
C101248	R8	RRCF 10K J 0,50
C311034	001	TUBPICSOC+SG11-13KV
C313580	002	CONMOBTE P1 0,5X2,8
C348019	003	WIRTIE L100
C349008	004	DRAADUNIT-C66002202
C313611	005	CONHOUSE LOCK 3
C315332	007	SOLDERLUG1D 4.2L 22
C721316	009	SHIELDCRTSOCKET30AX

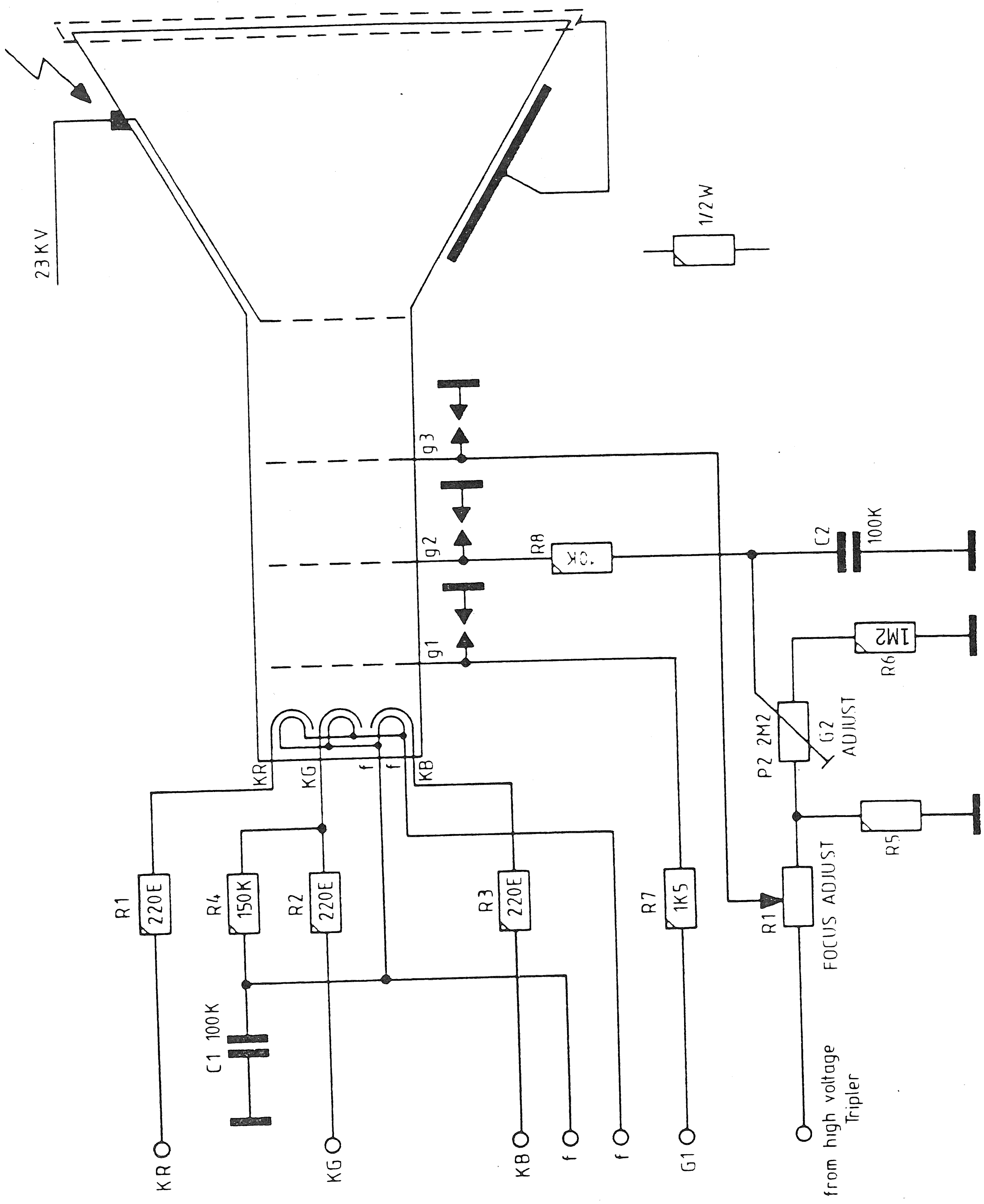
CRT socket unit **HR H** C660030


P2
C1
R1
R2
R3
R4
R7
f
f
R8
R6
R5
B
G
R
C2
12.5
P1

UN. CRTSOC14 H.R.   H

PART NR : C660030

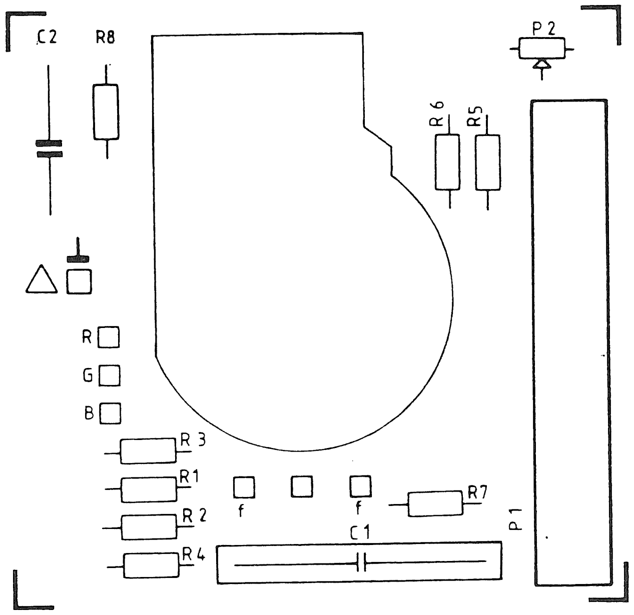
REF.NR.	POSITION	DESCRIPTION
C114874	C1	CPO AX100K M 630
C114602	C2	C HV 47K M 1000
C107607	P1	RPFOCUS 24M K 3,80
C1062151	P2	RTCAPPV 2M2 M 0,20
C605005	PC	PC CRTSOK CF33 01
C101228	R1	RRCF 220E J 0,50
C101228	R2	RRCF 220E J 0,50
C101228	R3	RRCF 220E J 0,50
C101262	R4	RRCF 150K J 0,50
C104656	R6	RRHV 1M2 J 0,50
C101238	R7	RRCF 1K5 J 0,50
C101248	R8	RRCF 10K J 0,50
C311034	001	TUBPICSOC+SG11-13KV
C313580	002	CONMABTE P1 0,5X2,8
C348019	003	WIRTIE L100
C349008	004	DRAADUNIT-C66002202
C313611	005	CONHOUSE LOCK 3
C315332	007	SOLDERLUG1D 4.2L 22
C721316	009	SHIELDCRTSOCKET30AX


23KV
1/2W
g3
g2
g1
R8
10K
C2
100K
R6
1M2
P2 2M2
G2
ADJUST
R5
R1
FOCUS ADJUST
KR
KG
f
f
KB
R1
220E
R4
150K
R2
220E
R3
220E
R7
1K5
C1 100K
KR
KG
KB
f
f
G1
from high voltage
Tripler

COLOR DISPLAY FRAME CF33

C660022, C660030

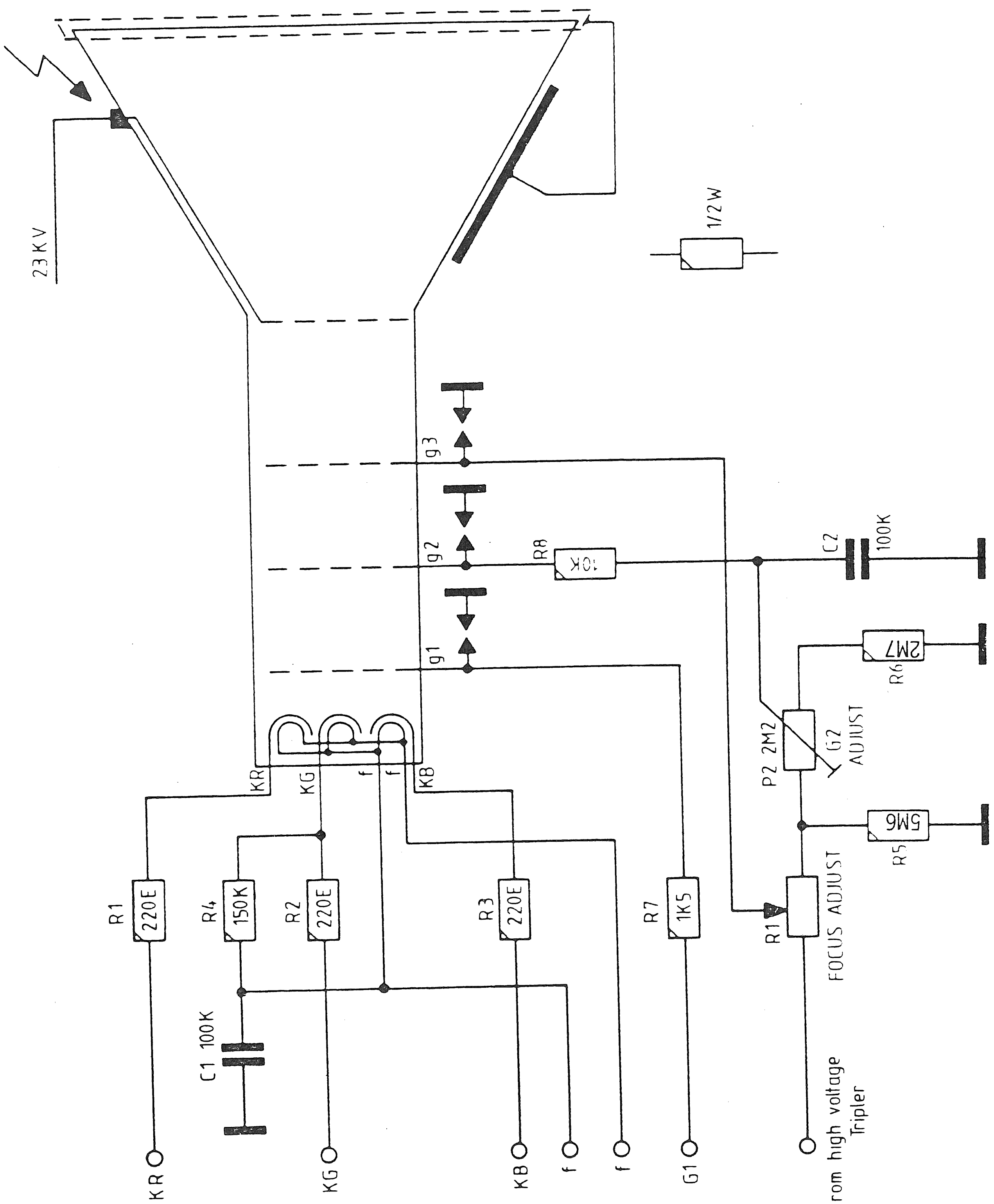
CRT socket unit SR C660031


C2
R8
P2
R6
R5
R
G
B
R3
R1
R2
R4
f
f
R7
C1
P1

UN.CRTSOC14 S.R. T

PART NR : C660031

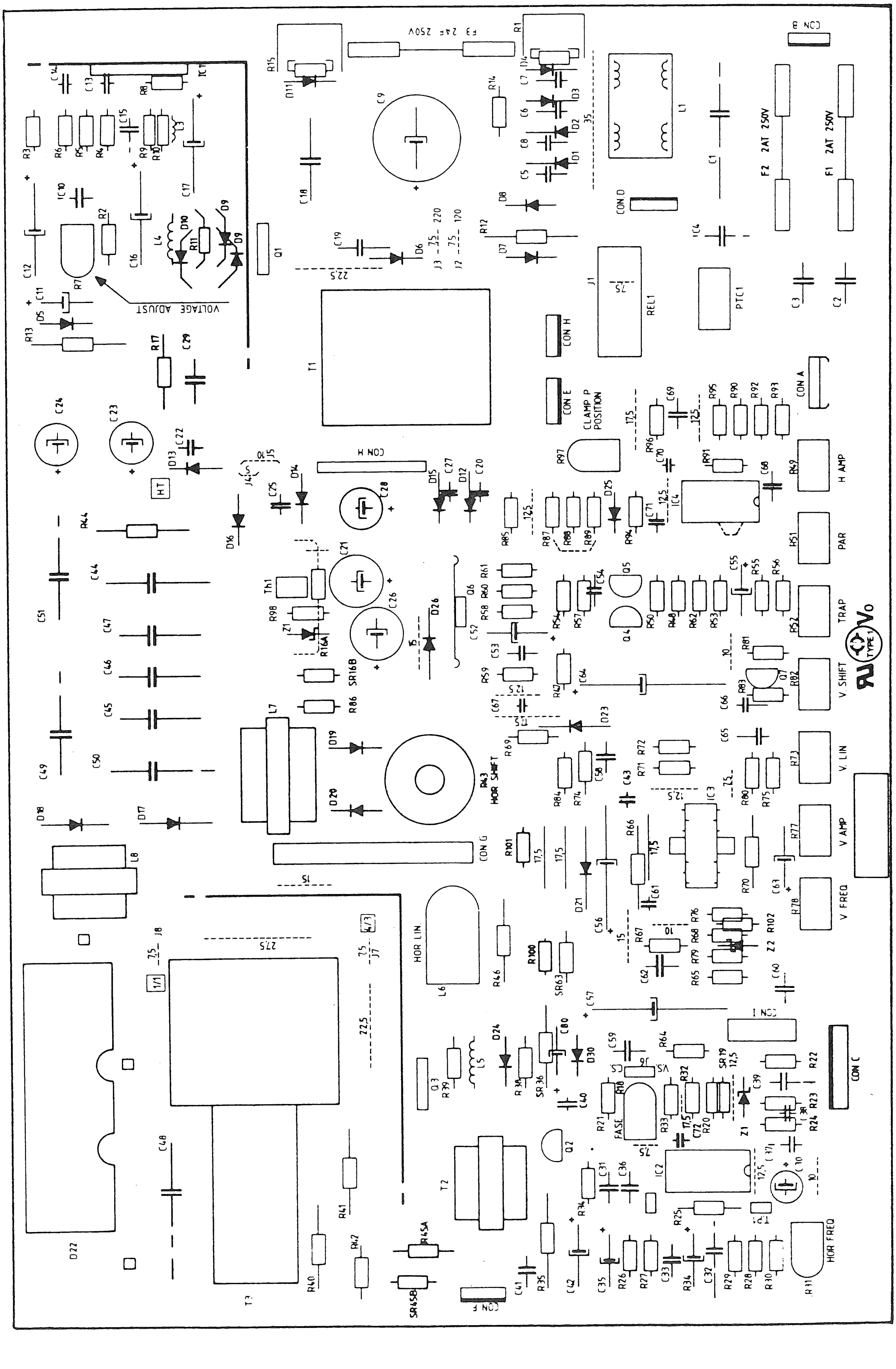
REF.NR.	POSITION	DESCRIPTION
C114874	C1	CPO AX100K M 630
C114602	C2	C HV 47K M 1000
C107608	P1	RPFOCUSL24M K 3,80
C1062151	P2	RTCAPPV 2M2 M 0,20
C605007	PC	PC CRTSOCKET CF33 T
C101228	R1	RRCF 220E J 0,50
C101228	R2	RRCF 220E J 0,50
C101228	R3	RRCF 220E J 0,50
C101262	R4	RRCF 150K J 0,50
C104672	R5	RRHV 5M6 J 0,50
C104664	R6	RRHV 2M7 J 0,50
C101238	R7	RRCF 1K5 J 0,50
C101248	R8	RRCF 10K J 0,50
C311025	001	TUBPICSOC+SG SB0882
C313580	002	CONMOBTE P1 0,5X2,8
C348019	003	WIRTIE L100
C349008	004	DRAADUNIT-C66002202
C313611	005	CONHOUSE LOCK 3
C315332	007	SOLDERLUG1D 4.2L 22
C721316	009	SHIELDCRTSOCKET30AX



23 KV
1/2 W
g3
g2
g1
R8
10K
C2
100K
R6
2M7
P2 2M2
G2
ADJUST
R5
5M6
R1
FOCUS ADJUST
KR
KG
f
f
KB
R1
220E
R4
150K
R2
220E
R3
220E
R7
1K5
C1 100K
KR
KG
KB
f
f
G1
from high voltage
Tripler

COLOR DISPLAY FRAME CF33	C660031	

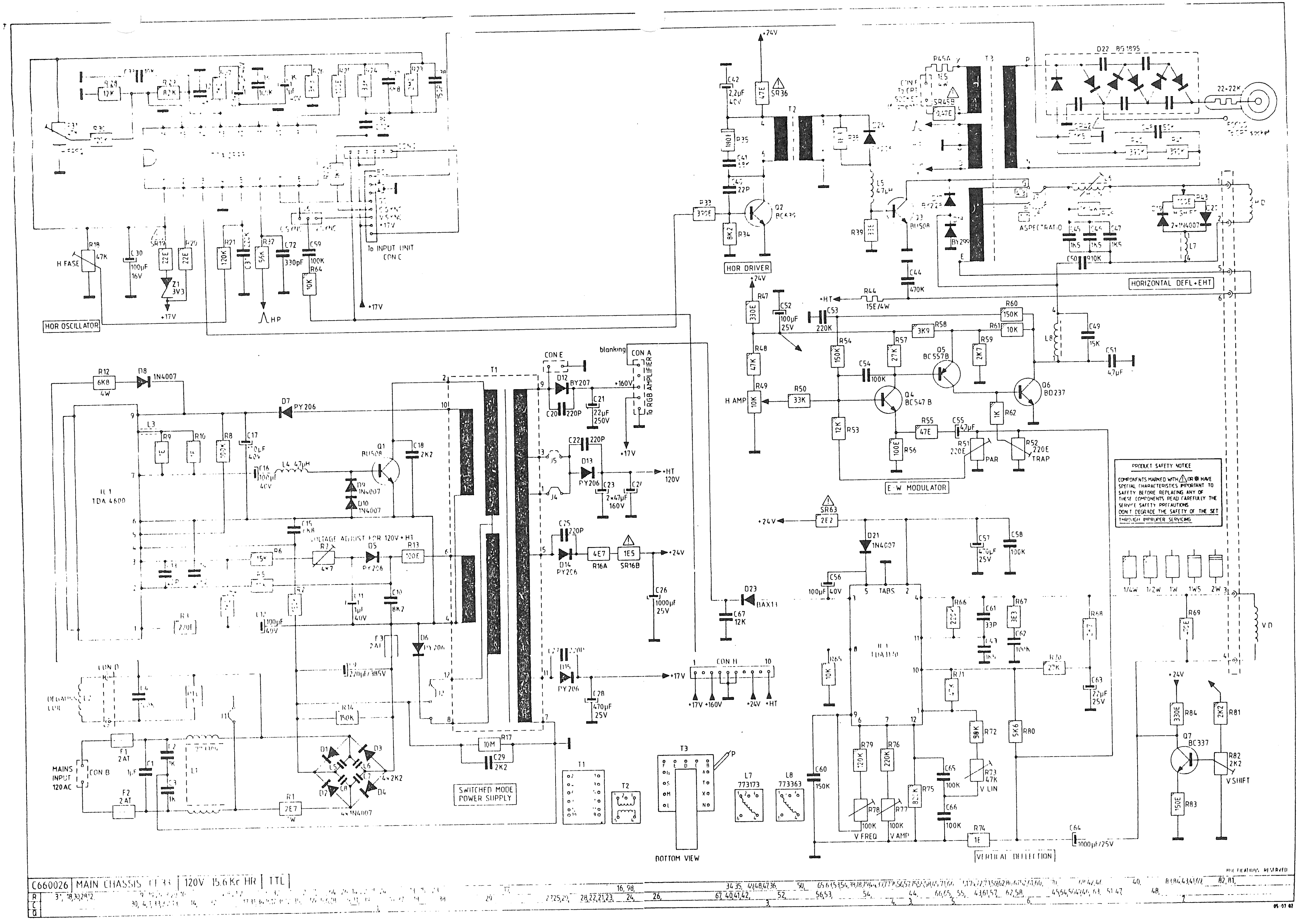
Main chassis


F3 2AF 250V
F2 2AT 250V
F1 2AT 250V
CON B
CON D
CON H
CON E
CON A
CON G
CON I
CON C
CON F
R1
R15
D11
D14
D1
D2
D3
C9
C18
C19
D6
J3 7,5 220
J2 7,5 120
22,5
35
L1
C1
C4
C2
C3
PTC1
REL1
J1
T1
Q1
IC1
C14
C13
R8
R3
R6
R5
R4
C15
R9
R10
L3
C17
C10
R2
C16
L4
D10
R11
D9
C12
R7
VOLTAGE ADJUST
C11
D5
R13
R17
C29
C24
C23
C22
D13
HT
J4
J5
C25
D14
C28
D15
C27
D12
C20
R14
C7
C6
C8
C5
D8
R12
D7
CLAMP P POSITION
C69
R95
R90
R92
R93
R96
R97
C70
R91
C68
R49
H AMP
R85
R87
R88
R89
D25
R94
C71
IC4
R51
PAR
R61
R60
R58
Q6
Q5
C54
C55
R55
R56
R57
R54
Q4
R50
R48
R62
R53
R52
TRAP
R81
Q7
R83
R82
V SHIFT
C66
C65
R73
V LIN
R72
R71
IC3
R80
R75
R77
V AMP
R70
C63
R78
V FREQ
R44
D16
C51
C44
C47
C46
C45
C50
C49
Th1
C21
C26
D26
R98
Z1
R16A
SR16B
R86
C52
C53
R59
R47
C64
C67
D23
R69
L7
D19
D20
R43 HOR SHIFT
R84
R74
C58
C43
R66
C61
R101
D21
C56
R67
R68
R76
R79
R65
Z2
R102
C62
C60
D18
D17
L8
D22
J8
J7
T3
C48
R40
R41
R42
R45A
SR45B
L6
HOR LIN
R46
R100
SR63
C57
D24
R38
SR36
C80
D30
L5
R39
Q3
C59
R64
J6
C40
R18
R21
FASE
R32
R33
C72
R20
SR19
C39
Z1
R22
R23
R24
C38
C37
C10
Q2
T2
R34
C31
C36
IC2
R25
C41
R35
C42
C35
R26
R27
C33
R34
C32
R29
R28
R30
R31
HOR FREQ
TYPE 1

Main Chassis

CF33 HR-TTL 120V C660026

CF33 MR-TTL 120V C6600261



HOR OSCILLATOR
H FASE
R18 47K
C30 100µF 16V
Z1 3V3
+17V
R21 120K
R37 56K
C72 330pF
C59 100K
R64 10K
HP
To INPUT UNIT CON C
HOR DRIVER
R33 330E
Q2 BC639
R34 8K2
C42 2,2µF 40V
R35 180E
C41
C43 22P
+24V
47E SR36
T2
L5 47µH
R39 33E
Q3 BU508
BY299
C44 470K
R44 15E/4W
+HT
D22 BG1895
22÷22K
R45A 1E5 4W
SR45B 0,47E
T3
ASPECT RATIO
C45 1K5
C46 1K5
C47 1K5
C50 910K
R43 100E H SHIFT
2×1N4007
L7
HD
HORIZONTAL DEFL+EHT
R47 330E
C52 100µF 25V
C53 220K
R48 47K
R49 10K
H AMP
R50 33K
R54 150K
R53 12K
C54 100K
Q4 BC547 B
R57 27K
R58 3K9
Q5 BC557B
R59 2K7
R60 150K
R61 10K
L8
C49 15K
C51 4,7µF
Q6 BD237
R62 1K
R55 47E
C55 47µF
R56 100E
R51 220E PAR
R52 220E TRAP
E W MODULATOR
R12 6K8 4W
D8 1N4007
D7 PY206
L3
R9
R10
R8 100K
C17 0LF 40V
C16 100µF 40V
L4 47µH
Q1 BU508
D9 1N4007
D10 1N4007
C18 2K2
IC1 TDA 4600
C15 6K8
VOLTAGE ADJUST FOR 120V +HT
R6 15K
R7 4K7
D5 PY206
R13 100E
C11 1µF 40V
C10 8K2
C12 100µF 40V
D6 PY206
F3 2AT
C9 220µF/385V
R14 150K
CON D
DEGAUSS COIL
MAINS INPUT 120AC
CON B
F1 2AT
F2 2AT
C1 1µF
C2 1K
C3 1K
L1
R1 2E7 W
D1 D2 D3 D4 4×1N4007
C5 C6 C7 C8 4×2K2
T1
CON E
D12 BY207
C20 220P
C21 22µF 250V
+160V
blanking
CON A
To RGB AMPLIFIER
+17V
C22 220P
J5
J4
D13 PY206
C23 2×47µF 160V
C27
+HT 120V
C25 220P
D14 PY206
R16A 4E7
1E5 SR16B
+24V
C26 1000µF 25V
D15 PY206
C28 470µF 25V
R17 10M
C29 2K2
SWITCHED MODE POWER SUPPLY
D23 BAX11
C67 12K
CON H
+17V +160V +24V +HT
BOTTOM VIEW
L7 773173
L8 773363
SR63 2E2
D21 1N4007
C56 100µF 40V
TABS
C57 470µF 25V
C58 100K
IC1 TDA1170
R65 10K
R66 220E
C61 33P
R67 3E3
C62 100K
R68
R69
R70 22K
C63 22µF 25V
R71 47K
R72 98K
R73 47K V LIN
R80 5K6
C60 150K
R79 120K
R76 220K
R78 100K V FREQ
R77 100K V AMP
R75 82K
C65 100K
C66 100K
R74 1E
C64 1000µF/25V
VERTICAL DEFLECTION
1/4W 1/2W 1W 1W5 2W
VD
R84 330E
Q7 BC337
R81 2K2
R82 2K2 V SHIFT
R83 150E
MODIFICATIONS RESERVED
05-07-83

PRODUCT SAFETY NOTICE

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DON'T DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING

C660026 | MAIN CHASSIS CT 33 | 120V 15.6Kc HR | TTL

UN.OEM 14.120.D.15.6
PART NR : C660026

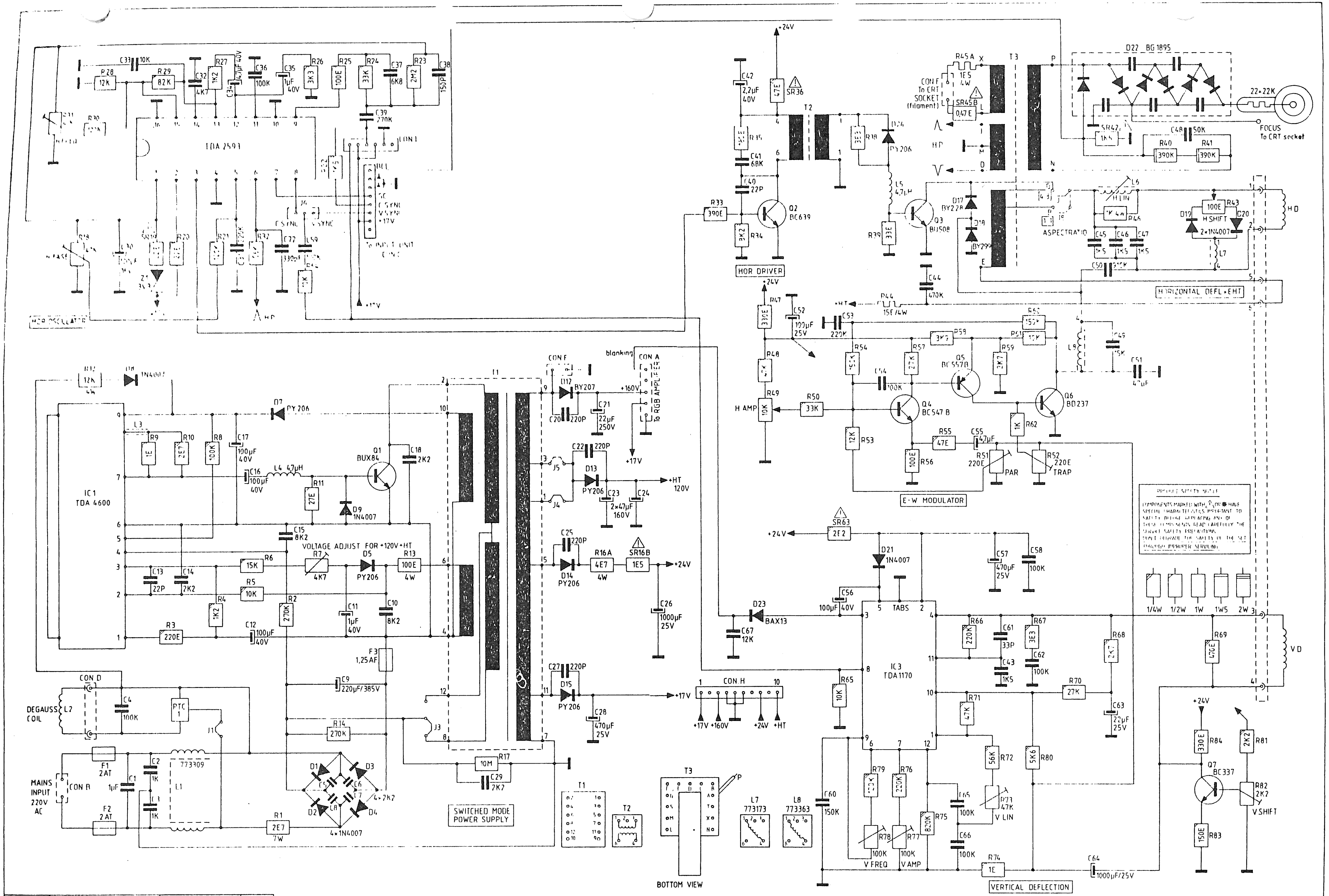
REF.NR.	POSITION	DESCRIPTION
C114716	C1	CPOSAPO 1M MAC250
C114720	C2	CCESA Y 1K M 400
C114720	C3	CCESA Y 1K M 400
C1147105	C4	CPOSAPO100K MAC250
C112829	C5	CCE DI 2K2 S 400
C112829	C6	CCE DI 2K2 S 400
C112829	C7	CCE DI 2K2 S 400
C112829	C8	CCE DI 2K2 S 400
C111654	C9	CELRA 220M T 385
C114521	C10	CPOMEPO 8K2 K 250
C1111841	C11	CELAX 1M T 40
C111190	C12	CELAX 100M T 40
C112234	C13	CNPO MI 22P G5 63
C112829	C14	CCE DI 2K2 S 400
C1139102	C15	CPETPEP 6K8 J 250
C111190	C16	CELAX 100M T 40
C111190	C17	CELAX 100M T 40
C1117221	C18	CPP DD 15K J 1500
C112094	C20	CCE DI220P K 750
C111418	C21	CELSN 22M T 350
C112094	C22	CCE DI220P K 750
C111399	C23	CELSN 47M T 160
C111399	C24	CELSN 47M T 160
C112094	C25	CCE DI220P K 750
C111350	C26	CELSC 1000M T 25
C112094	C27	CCE DI220P K 750
C111479	C28	CELPR 470M Z 25
C114722	C29	CMAINS 2K2 Y 400
C111466	C30	CELPR 100M Z 16
C114102	C31	CPOMEFF220K K 100
C1160505	C32	CPPFFRA 4K7 G 63
C114120	C33	CPOMEFF 10K K 250
C111184	C34	CELAX 4M7 Z 40
C1111841	C35	CELAX 1M T 40
C114100	C36	CPOMEFF100K K 100
C1139102	C37	CPETPEP 6K8 J 250
C112364	C38	CN750MI150P G5 63
C1141031	C39	CPOMEFF270K K 100
C112234	C40	CNPO MI 22P G5 63
C114130	C41	CPOMEFF 68K K 250
C111196	C42	CELAX 2M2 Z 63
C111184	C43	CELAX 4K7 Z 40
C114442	C44	CPO FF470K K 250
C111761	C45	CPP DD 1K5 J 1500
C111761	C46	CPP DD 1K5 J 1500
C111761	C47	CPP DD 1K5 J 1500
C114636	C48	C HV 50K M 1600
C1117221	C49	CPP DD 15K J 1500
C1145961	C50	CPP PO910K K 250
C114110	C51	CPOMEFF 4M7 K 100
C111157	C52	CELAX 22M Z 25
C114102	C53	CPOMEFF220K K 100
C114100	C54	CPOMEFF100K K 100
C111184	C55	CELAX 4M7 Z 40
C111190	C56	CELAX 100M T 40
C111163	C57	CELAX 470M T 25
C114100	C58	CPOMEFF100K K 100
C114100	C59	CPOMEFF100K K 100
C114101	C60	CPOMEFF150K K 100
C112236	C61	CNPO MI 33P G5 63
C114100	C62	CPOMEFF100K K 100
C111157	C63	CELAX 22M Z 25
C111164	C64	CELAX 1000M T 25
C114100	C65	CPOMEFF100K K 100
C114100	C66	CPOMEFF100K K 100
C114123	C67	CPOMEFF 18K K 250
C131646	D1	SMCDIOREC 1N 4007
C131646	D2	SMCDIOREC 1N 4007
C131646	D3	SMCDIOREC 1N 4007
C131646	D4	SMCDIOREC 1N 4007
C131911	D5	SMCDIOREC PY 206
C131911	D6	SMCDIOREC PY 206
C131911	D7	SMCDIOREC PY 206
C131646	D8	SMCDIOREC 1N 4007
C131646	D9	SMCDIOREC 1N 4007
C131646	D10	SMCDIOREC 1N 4007
C131911	D11	SMCDIOREC PY 206
C131910	D12	SMCDIOREC BY [illegible]
C131911	D13	SMCDIOREC PY 206
C131911	D14	SMCDIOREC PY 206
C131911	D15	SMCDIOREC PY 206
C131917	D17	SMCDIO BY 22[illegible]
C131921	D18	SMCDIOREC BY 299
C131646	D19	SMCDIOREC 1N 4007
C131646	D20	SMCDIOREC 1N 4007
C131646	D21	SMCDIOREC 1N 4007
C132057	D22	SMCDIOREC BG 1[illegible]95
C131621	D23	SMCDIO BAX [illegible]
C314138	F1	FUSE 2A SLOW
C314138	F2	FUSE 2A SLOW
C314139	F3	FUSE 2A FAST
C132747	IC1	SMICILSM TDA46[illegible]
C132748	IC2	SMICLOSE TDA25[illegible]
C132164	IC3	SMICLWBA TDA1[illegible]
C773309	L1	SPOCHOKE [illegible]
C302108	L3	CHOKE CHO 1/3,5[illegible]
C3061282	L4	CHOKE NMS407 K
C3061282	L5	CHOKE NMS407 K
C306403	L6	LINE C 4142/[illegible]
C773173	L7	SPOCHO HOR+EHT [illegible]
C773363	L8	SPOBRIDGE [illegible]
C605001	PC	P[illegible] [illegible]660 [illegible]
C105210	PTC1	RRPTC [illegible]
C132574	Q1	SMCTRA BC [illegible]
C132562	Q2	SMCTRA BC 639
C132574	Q3	SMCTRA BC [illegible]
C1314071	Q4	SMCTRA BC 547B
C1314131	Q5	SMCTRA BC 557B
C1314446	Q6	SMCTRA BD 237
C131426	Q7	SMCTRA BC [illegible]

REF.NR.	POSITION	DESCRIPTION
C104369	R1	RRWW V 2E7 K 9
C101262	R2	RRCF 150K J 0,50
C101128	R3	RRCF 220E J 0,25
C101137	R4	RRCF 1K2 J 0,25
C101148	R5	RRCF 10K J 0,25
C101149	R6	RRCF 12K J 0,25
C1061071	R7	RECP10H 10K M 0,10
C101160	R8	RRCF 100K J 0,25
C101100	R9	RRCF 1E J 0,25
C101100	R10	RRCF 1E J 0,25
C103346	R12	RRMO 6K8 J 4
C103636	R13	RRWW H 100E J 4
C101262	R14	RRCF 150K J 0,50
C103622	R16	RRWW H 6E8 K 4
C1046781	R17	RRHV 10M J 1
C1061094	R18	REMP10 47K M 0,50
C1011269	R19	RRCFFUL150E J 0,25
C101116	R20	RRCF 22E J 0,25
C101164	R21	RRCF 220K J 0,25
C101138	R22	RRCF 1K5 J 0,25
C101176	R23	RRCF 2M2 K 0,25
C101154	R24	RRCF 33K J 0,25
C101124	R25	RRCF 100E J 0,25
C101142	R26	RRCF 3K3 J 0,25
C101137	R27	RRCF 1K2 J 0,25
C102549	R28	RRMF 12K G 0,25
C101159	R29	RRCF 82K J 0,25
C101161	R30	RRCF 120K J 0,25
C1061094	R31	REMP10 47K M 0,50
C101257	R32	RRCF 56K J 0,50
C101131	R33	RRCF 390E J 0,25
C101147	R34	RRCF 8K2 J 0,25
C101427	R35	RRCF 180E J 1,50
C103632	R36	RRWW H 47E K 4
C1011129	R37	RRCFFUL 10E J 0,25
C101206	R38	RRCF 3E3 J 0,50
C101218	R39	RRCF 33E J 0,50
C101467	R40	RRCF 390K J 1,50
C101467	R41	RRCF 390K J 1,50
C1012389	R42	RRCFFUL 1K5 J 0,50
C106511	R43	RTWW KH100E K 2
C103626	R44	RRWW H 15E K 4
C104199	R45	RRWWF V 2E2 K 4
C103660	R46	RRWW H 1K K 4
C101230	R47	RRCF 330E J 0,50
C101156	R48	RRCF 47K J 0,25
C1062071	R49	RTCAPPV 10K M 0,20
C101154	R50	RRCF 33K J 0,25
C1062021	R51	RTCAPPV220E M 0,20
C1062021	R52	RTCAPPV220E M 0,20
C101149	R53	RRCF 12K J 0,25
C101162	R54	RRCF 150K J 0,25
C101120	R55	RRCF 47E J 0,25
C101124	R56	RRCF 100E J 0,25
C101153	R57	RRCF 27K J 0,25
C101143	R58	RRCF 3E9 J 0,25
C101141	R59	RRCF 2E7 J 0,25
C101162	R60	RRCF 150K J 0,25
C101148	R61	RRCF 10K J 0,25
C101136	R62	RRCF 1E J 0,25
C1011049	R63	RRCFFUL 2E2 J 0,25
C101148	R64	RRCF 10K J 0,25
C101148	R65	RRCF 10K J 0,25
C101164	R66	RRCF 220K J 0,25
C101106	R67	RRCF 3E3 J 0,25
C101150	R68	RRCF 15K J 0,25
C101132	R69	RRCF 470E J 0,25
C101150	R70	RRCF 15K J 0,25
C101156	R71	RRCF 47K J 0,25
C101155	R72	RRCF 39K J 0,25
C1062091	R73	RRCAPPV 47K J 0,20
C101100	R74	RRCF 1E J 0,25
C101168	R75	RRCF 470K J 0,25
C101164	R76	RRCF 220K J 0,25
C1062111	R77	RTCAPPV100K M 0,20
C1062111	R78	RTCAPPV100K M 0,20
C101162	R79	RRCF 150K J 0,25
C101145	R80	RRCF 5K6 J 0,25
C101144	R81	RRCF 4K7 J 0,25
C1062051	R82	RTCAPPV 2K2 M 0,20
C101226	R83	RRCF 150E J 0,50
C101232	R84	RRCF 470E J 0,50
C670002	T1	TRFSMPOWER CF
C670003	T2	TRFDRIVER CF
C670004	T3	TRFLINE CF

Main Chassis

CF33 HR-TTL 220V C660027

CF33 MR-TTL 220V C6600271


HOR OSCILLATOR
TDA 2593
HOR DRIVER
Q2 BC639
Q3 BU508
T2
T3
D22 BG1895
22+22K
FOCUS To CRT socket
CONF To CRT SOCKET (filament)
HORIZONTAL DEFL + EHT
HD
ASPECTRATIO
H LIN
H SHIFT
E-W MODULATOR
Q4 BC547 B
Q5 BC557B
Q6 BD237
H AMP
PAR
TRAP
IC1 TDA 4600
Q1 BUX84
VOLTAGE ADJUST FOR +120V+HT
T1
SWITCHED MODE POWER SUPPLY
DEGAUSS COIL
MAINS INPUT 220V AC
CON A To RGB AMPL
CON D
CON B
CON F
CON H
+HT 120V
+24V
+17V
+160V
blanking
IC3 TDA1170
VD
V LIN
V FREQ
V AMP
V SHIFT
Q7 BC337
VERTICAL DEFLECTION
BOTTOM VIEW
L7 773173
L8 773363
1/4W 1/2W 1W 1W5 2W

C660027 | MAIN CHASSIS CF33 | 220V 15.6Kc HR | TTL

MODIFICATIONS RESERVED

06-07-82

UN.OEM 14.220.D.1[illegible].6
PART NR : C660027

REF.NR.	POSITION	DESCRIPTION	REF.NR.	POSITION	DESCRIPTION
C114716	C1	CPOSAPO 1M MAC250	C114100	C58	CPOMEFF100K K 100
C114720	C2	CCESA Y 1K M 400	C114100	C59	CPOMEFF100K K 100
C114720	C3	CCESA Y 1K M 400	C114101	C60	CPOMEFF150K K 100
C1147105	C4	CPOSAPO100K MAC250	C112236	C61	CNPO MI 33P G5 63
C112829	C5	CCE DI 2K2 S 400	C114100	C62	CPOMEFF100K K 100
C112829	C6	CCE DI 2K2 S 400	C111157	C63	CELAX 22M Z 25
C112829	C7	CCE DI 2K2 S 400	C111164	C64	CELAX 1000M T 25
C112829	C8	CCE DI 2K2 S 400	C114100	C65	CPOMEFF100K K 100
C111654	C9	CELPA 220M T 385	C114100	C66	CPOMEFF100K K 100
C114521	C10	CPOMEPO 8K2 K 250	C114123	C67	CPOMEFF 18K K 250
C1111841	C11	CELAX 1M T 40	C131646	D1	SMCDIOREC 1N 4007
C111190	C12	CELAX 100M T 40	C131646	D2	SMCDIOREC 1N 4007
C112234	C13	CNPO MI 22P G5 63	C131646	D3	SMCDIOREC 1N 4007
C112829	C14	CCE DI 2K2 S 400	C131646	D4	SMCDIOREC 1N 4007
C114521	C15	CPOMEPO 8K2 K 250	C131911	D5	SMCDIOREC PY 206
C111190	C16	CELAX 100M T 40	C131911	D7	SMCDIOREC PY 206
C111190	C17	CELAX 100M T 40	C131646	D8	SMCDIOREC 1N 4007
C1150051	C18	CPP 2K2 J 1500	C131646	D9	SMCDIOREC 1N 4007
C112094	C20	CCE DI220P K 750	C131910	D12	SMCDIOREC BY 207
C111418	C21	CELSN 22M T 350	C131911	D13	SMCDIOREC PY 206
C112094	C22	CCE DI220P K 750	C131911	D14	SMCDIOREC PY 206
C111399	C23	CELSN 47M T 160	C131911	D15	SMCDIOREC PY 206
C111399	C24	CELSN 47M T 160	C131917	D17	SMCDIO BY 228
C112094	C25	CCE DI220P K 750	C131921	D18	SMCDIOREC BY 299
C111350	C26	CELSC 1000M T 25	C131646	D19	SMCDIOREC 1N 4007
C112094	C27	CCE DI220P K 750	C131646	D20	SMCDIOREC 1N 4007
C111479	C28	CELPR 470M Z 25	C131646	D21	SMCDIOREC 1N 4007
C114722	C29	CMAINS 2K2 Y 400	C132057	D22	SMCDIOREC BG 1895
C111466	C30	CELPR 100M Z 16	C131621	D23	SMCDIO BAX 13
C114102	C31	CPOMEFF220K K 100	C314116	F1	FUSE 2A SLOW
C1160505	C32	CPPFFRA 4K7 G 63	C314116	F2	FUSE 2A SLOW
C114120	C33	CPOMEFF 10K K 250	C314102	F3	FUSE 1A250 FAST
C111184	C34	CELAX 4M7 Z 40	C132747	IC1	SMCICLSM TDA4600
C1111841	C35	CELAX 1M T 40	C132748	IC2	SMCICLOSE TDA2593
C114100	C36	CPOMEFF100K K 100	C132164	IC3	SMCICLWBA TDA1170
C1139102	C37	CPETPEP 6K8 J 250	C773309	L1	SPOCHOKE NETBWCTV32
C112364	C38	CN750MI150P G5 63	C302108	L3	CHORE CHO 1/3,5X 3
C1141031	C39	CPOMEFF270K K 100	C3061282	L4	CHOKE NMS4U7 K
C112234	C40	CNPO MI 22P G5 63	C3061282	L5	CHOKE NMS4U7 K
C114130	C41	CPOMEFF 68K K 250	C306403	L6	LINE C 4042/02 34
C111196	C42	CELAX 2M2 Z 63	C773173	L7	SPOCHO HOR+EHT31R
C111184	C43	CELAX 4K7 Z 40	C773363	L8	SPOBRIDGE 34GS
C114442	C44	CPO FF470K K 250	C605001	PC	PC -C660027
C111761	C45	CPP DD 1K5 J 1500	C105209	PTC1	RRPTC 220
C111761	C46	CPP DD 1K5 J 1500	C132517	Q1	SMCTRA BUX 84
C111761	C47	CPP DD 1K5 J 1500	C132562	Q2	SMCTRA BC 639
C114636	C48	C HV 50K M 1600	C132574	Q3	SMCTRA BU 508A
C1117221	C49	CPP DD 15K J 1500	C1314071	Q4	SMCTRA BC 547B
C1145961	C50	CPP PO910K K 250	C1314131	Q5	SMCTRA BC 557B
C114110	C51	CPOMEFF 4M7 K 100	C1314446	Q6	SMCTRA BD 237
C111157	C52	CELAX 22M Z 25	C131426	Q7	SMCTRA BC 337
C114102	C53	CPOMEFF220K K 100	C104309	R1	RRWW V 2E7 K 9
C114100	C54	CPOMEFF100K K 100	C101265	R2	RRCF 270K J 0,50
C111184	C55	CELAX 4M7 Z 40	C101128	R3	RRCF 220E J 0,25
C111190	C56	CELAX 100M T 40	C101137	R4	RRCF 1K2 J 0,25
C111163	C57	CELAX 470M T 25	C101148	R5	RRCF 10K J 0,25

REF.NR.	POSITION	DESCRIPTION
C101149	R6	RRCF 12K J 0,25
C1061071	R7	RECP10H 10K M 0,10
C101160	R8	RRCF 100K J 0,25
C101100	R9	RRCF 1E J 0,25
C101105	R10	RRCF 2E7 J 0,25
C101217	R11	RRCF 27E J 0,50
C103349	R12	RRMO 12K J 4
C103636	R13	RRWW H 100E J 4
C101265	R14	RRCF 270K J 0,50
C103622	R16	RRWW H 6E8 K 4
C1046781	R17	RRHV 10M J 1
C1061094	R18	REMP10 47K M 0,50
C1011269	R19	RRCFFUL150E J 0,25
C101116	R20	RRCF 22E J 0,25
C101164	R21	RRCF 220K J 0,25
C101138	R22	RRCF 1K5 J 0,25
C101176	R23	RRCF 2M2 K 0,25
C101154	R24	RRCF 33K J 0,25
C101124	R25	RRCF 100E J 0,25
C101142	R26	RRCF 3K3 J 0,25
C101137	R27	RRCF 1K2 J 0,25
C102549	R28	RRMF 12K G 0,25
C101159	R29	RRCF 82K J 0,25
C101161	R30	RRCF 120K J 0,25
C1061094	R31	REMP10 47K M 0,50
C101257	R32	RRCF 56K J 0,50
C101131	R33	RRCF 390E J 0,25
C101147	R34	RRCF 8K2 J 0,25
C101427	R35	RRCF 180E J 1,50
C103632	R36	RRWW H 47E K 4
C1011129	R37	RRCFFUL 10E J 0,25
C101206	R38	RRCF 3E3 J 0,50
C101218	R39	RRCF 33E J 0,50
C101467	R40	RRCF 390K J 1,50
C101467	R41	RRCF 390K J 1,50
C1012389	R42	RRCFFUL 1K5 J 0,50
C106511	R43	RTWW KH100E K 2
C103626	R44	RRWW H 15E K 4
C104199	R45	RRWWF V 2E2 K 4
C103660	R46	RRWW H 1K K 4
C101230	R47	RRCF 330E J 0,50
C101156	R48	RRCF 47K J 0,25
C1062071	R49	RTCAPPV 10K M 0,20
C101154	R50	RRCF 33K J 0,25
C1062021	R51	RTCAPPV220E M 0,20
C1062021	R52	RTCAPPV220E M 0,20
C1062021	R52	RTCAPPV220E M 0,20
C101149	R53	RRCF 12K J 0,25
C101162	R54	RRCF 150K J 0,25
C101120	R55	RRCF 47E J 0,25
C101124	R56	RRCF 100E J 0,25
C101153	R57	RRCF 27K J 0,25
C101143	R58	RRCF 3K9 J 0,25
C101141	R59	RRCF 2K7 J 0,25
C101162	R60	RRCF 150K J 0,25

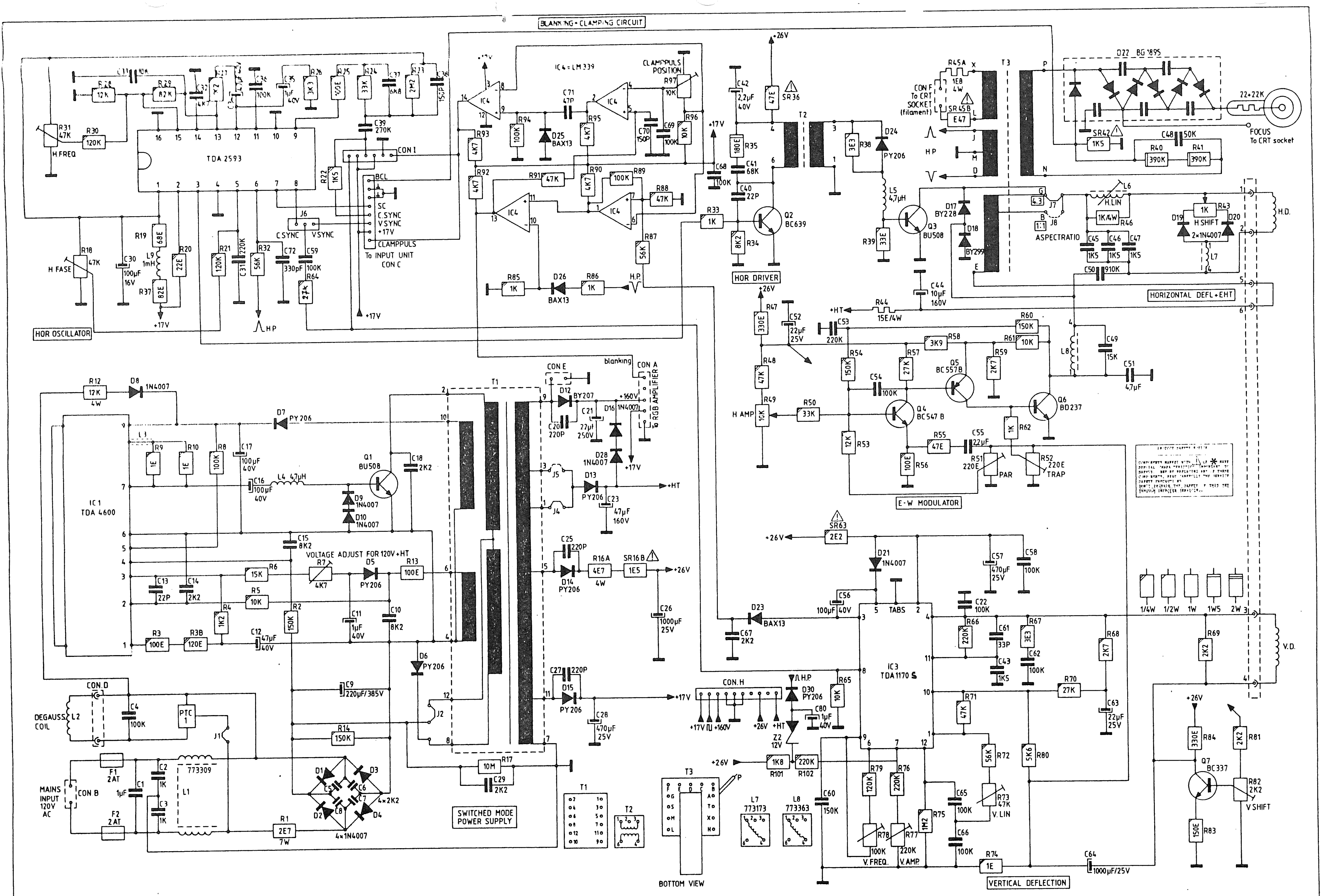
REF.NR.	POSITION	DESCRIPTION
C101148	R61	RRCF 10K J 0,25
C101136	R62	RRCF 1K J 0,25
C1011049	R63	RRCFFUL 2E2 J 0,25
C101148	R64	RRCF 10K J 0,25
C101148	R65	RRCF 10K J 0,25
C101164	R66	RRCF 220K J 0,25
C101106	R67	RRCF 3E3 J 0,25
C101150	R68	RRCF 15K J 0,25
C101132	R69	RRCF 470E J 0,25
C101150	R70	RRCF 15K J 0,25
C101156	R71	RRCF 47K J 0,25
C101155	R72	RRCF 39K J 0,25
C1062091	R73	RRCAPPV 47K J 0,20
C101100	R74	RRCF 1E J 0,25
C101168	R75	RRCF 470K J 0,25
C101164	R76	RRCF 220K J 0,25
C1062111	R77	RTCAPPV100K M 0,20
C1062111	R78	RTCAPPV100K M 0,20
C101162	R79	RRCF 150K J 0,25
C101145	R80	RRCF 5K6 J 0,25
C101144	R81	RRCF 4K7 J 0,25
C1062051	R82	RTCAPPV 2K2 M 0,20
C101226	R83	RRCF 150E J 0,50
C101232	R84	RRCF 470E J 0,50
C670002	T1	TRFSMPOWER OEM
C670003	T2	TRFDRIVER OEM
C670004	T3	TRFLINE OEM
C362122		SMP+ M 3 X 8 D7985
C366102		NUT M 3 H D 934
C367502		WASHER LA 3,2 D6798
C133052		SMCTRA COOLER TO220
C133053		SMC IC COOLER DUAL
C600017		KOELPLAAT OEM
C133055		SMCTRAINSULATSOT-93
C133054		SMCTRACLIP SOT-93
C313607		CONPOSTHEADER 3
C313612		CONMINIMATCH M2,5-8
C313581		CONMOBTE P5
C313612		CONMINIMATCH M2,5-8
C133032		SMC FIX TO 126
C313276		CONMOBTE 2,5 P10
C313276		CONMOBTE 2,5 P10
C3133921		CONF2,54 JUMPER SN
C314501		FUSE CLIPS
C313220		RRWW V HOLDER H10

BARCO

Main Chassis

CF33 HRA 120V C660032

CF33 MRA 120V C6600321


BLANKING + CLAMPING CIRCUIT
HOR OSCILLATOR
TDA 2593
H.FREQ
H FASE
IC4 = LM 339
CLAMPPULS POSITION
CON I
BCL
SC
C.SYNC
V.SYNC
+17V
CLAMPPULS
To INPUT UNIT CON C
HOR DRIVER
Q2 BC639
T2
T3
Q3 BU508
D17 BY228
D18 BY299
CON F To CRT SOCKET (filament)
D22 BG 1895
FOCUS To CRT socket
22+22K
ASPECTRATIO
H.LIN
H SHIFT
H.D.
HORIZONTAL DEFL + EHT
E-W MODULATOR
Q4 BC547 B
Q5 BC557B
Q6 BD237
PAR
TRAP
H AMP
IC1 TDA 4600
Q1 BU508
VOLTAGE ADJUST FOR 120V + HT
T1
CON E
CON A
RGB AMPLIFIER
blanking
SWITCHED MODE POWER SUPPLY
DEGAUSS COIL
CON.D
MAINS INPUT 120V AC
CON B
PTC
773309
CON.H
IC3 TDA 1170 S
V.FREQ.
V.AMP.
V.LIN
V.SHIFT
Q7 BC337
V.D.
VERTICAL DEFLECTION
BOTTOM VIEW
L7 773173
L8 773363
1/4W
1/2W
1W
1W5
2W
+26V
+17V
+HT
+160V

C660032(1) MAIN CHASSIS CF33 120V

MODIFICATIONS RESERVED

R 31, 18,30,28,12, 9, 19,29, 3,20, 10,37, 38, 4,8,21,27, 5, 6, 32, 1, 2, 7, ,64, 26, 14,22, 25, 24, 13, 23, 92,93 17, 85,94, 91, 86, 90,95,16, 89,87, 88, 96,97, 33, 34,35, 49,48,47,36,101,102,50, 65,63,53,54,38,78,79,44,39,77,76,56,57,75,55,58,45, 71,66, 51,74,72,73,59,62,80,67,52,61,60, 70, 68,42,46, 40, 83,84,43,41,69, 82, 81,

C 30, 4, 1,33,3,2,13, 14, 32, 17,31,34,16,12,36,12, 35,72,59, 5,6,7,8, , 9, 11, 39, 10, 37, 18, 38, 29, 27,25,20, 71,28, ,21,23; 70, 26, 69, 68, 67, 40,41,42, 52, 80, 56,53, 54, 44, 66,65, 55, 43,61,57, 62,58, 45,64,50,49,46, 63, 51, 47 48,

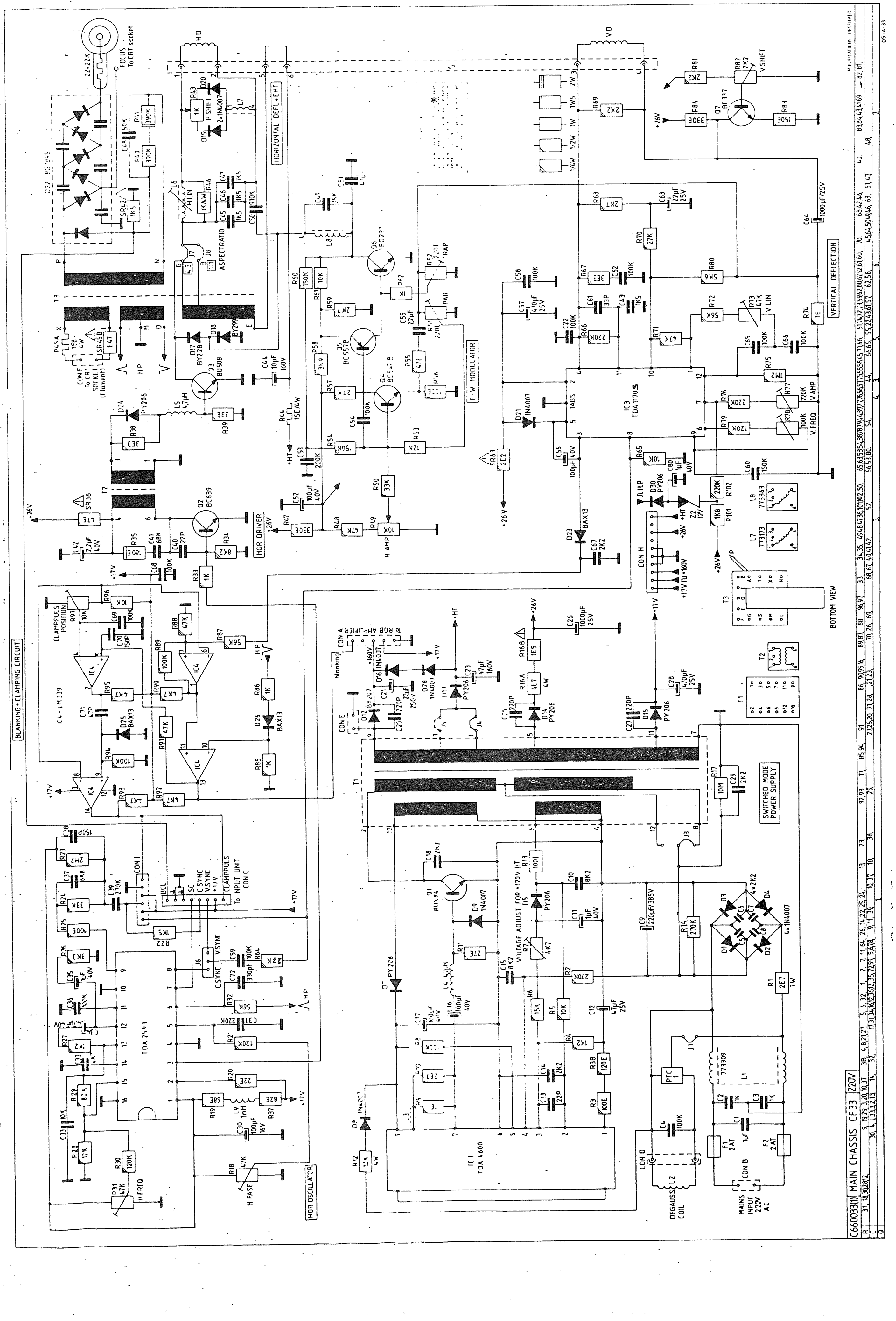
Q 1. 3. 4. 3. 5. 6. 7.

BARCO

Main Chassis

CF33 HRA 220V C660033

CF33 MRA 220V C6600331


BLANKING + CLAMPING CIRCUIT
IC4 = LM339
HOR DRIVER
HORIZONTAL DEFL + EHT
E-W MODULATOR
VERTICAL DEFLECTION
IC3 TDA1170S
IC1 TDA4600
TDA2591
HOR OSCILLATOR
SWITCHED MODE POWER SUPPLY
DEGAUSS COIL
MAINS INPUT 220V AC
FOCUS To CRT socket
ASPECTRATIO
BOTTOM VIEW
VOLTAGE ADJUST FOR +120V HT
CLAMPPULS To INPUT UNIT CON C
To RGB AMPLIFIER CON A
H FREQ
H FASE
H AMP
H SHIFT
H LIN
V SHIFT
V LIN
V AMP
V FREQ
PAR
TRAP
05-4-83

C66003(1) MAIN CHASSIS CF33 220V

BARCO

Codes to Parts Lists

AUTPC : automatic printed circuit board

Ch. support : chassis support
CPL : complete
CERFIL : ceramic filter
C EL AX : capacitor electrolytic axial
C CE MI : capacitor ceramic miniature
C CE SA DI : capacitor ceramic save disc
C CE UM : capacitor ceramic up right mounted
C EL PR : capacitor electrolytic printed circuit
C EL SN : capacitor electrolytic snap-in
C EL TA : capacitor electrolytic tantalium
C NPO TU : capacitor ceramic class 1, temp. coeff. NPO, tubular
C N152 : capacitor ceramic class 1, temp. coeff. N1500
C NPO MI : capacitor ceramic class 1, temp. coeff. NPO, miniature
C HV : capacitor high voltage
C PE TP FP : capacitor polyethylene tinned plate flat pack
C PO AX : capacitor polyester axial
C PO FF : capacitor polyester film foil
C PO ME FF : capacitor polyester metal film foil
C PO ME PO : capacitor polyester metal potted
C PO SA PO : capacitor polyester save potted
C PP DD : capacitor polypropylene dual dielectric
C SR : capacitor styroflex
C ST TR : capacitor steatiet trapezium or trimmer

CON 8P 1Z EPC : connector 8 pin 1 marker single printed circuit
CON PIN OWIRE : connector pin on wire
CON F O B S E AUD P : connector female on board side entrance audio pin
CON F O B S E PHO P : connector female on board side entrance phone pin
CON F O B T E : connector female on board top entrance
CON F O C T E COA BNC : connector female on board top entrance coax BNC
CON M O B T E : connector male on board top entrance
CON M O B T E P10 : connector male on board top entrance pin 10

DEF COM LINE C : deflection components line control
DEF COM MULTIP : deflection components multipole
DEF COM YOKE : deflection components yoke
DELAY L : delay line

Fix. : fixation
Fix. degaussing ABS : degaussing fixation ABS
Fix. degaussing NYL : degaussing fixation nylon
Fix. rib : fixation rib

PC : printed circuit board

R M CA S : resistor group multiturnpotentiometer carbon standard
R P CA : resistor group potentiometer carbon
R P CA M H : resistor group potentiometer carbon miniature horizontal
R R CF : resistor group resistor carbon film
R R HV : resistor group resistor high voltage
R R MO : resistor group resistor metal oxide
R R NTC : resistor group resistor negative temp. coeff.
R R PTC : resistor group resistor positive temp. coeff.
R R WW : resistor group resistor wire wound
R R WW H : resistor group resistor wire wound horizontal
R R WW V : resistor group resistor wire wound vertical
R T CA KH : resistor group trimmerpotentiometer carbon knob horizontal
R T CA M : resistor group trimmerpotentiometer carbon miniature
R T CA S : resistor group trimmerpotentiometer carbon standard
R T WT : resistor group trimmerpotentiometer wire wound tapped
R T WW : resistor group trimmerpotentiometer wire wound

SMC DIO : semiconductor diode
SMC DIO PIN : semiconductor diode pin
SMC DIO REC : semiconductor diode rectifier
SMC DIO VAR : semiconductor diode varicap
SMC ICD : semiconductor integrated circuit digital
SMC ICL : semiconductor integrated circuit linear
SMC IC LED : semiconductor integrated circuit LED diode
SMC ICL MAT : semiconductor integrated circuit linear matrix
SMC ICL OSC : semiconductor integrated circuit linear oscillator
SMC ICL POA : semiconductor integrated circuit linear power amplifier
SMC ICL VOL : semiconductor integrated circuit linear voltage
SMC THY : semiconductor thyristor
SMC TRA : semiconductor transistor
SMP : screw metal parallel head
SPO choke : choke coil
SPO IF : coil intermediate frequency
SPON : mains coil
SPO REJ : rejector coil

TF : thick film
TRF EHT : transformer extra high tension
TRF SM Power : transformer switch mode power
TUBPIC : picture tube
TUBPICSOC : picture tube socket

X-tal : crystal

Wirtie : wire tie

NOTES